Modern Educational Psychology

BY

B. N JHA, B.Ed. (Edin),

WITH AN INTRODUCTION BY

Prof JAMES DREVER, M.A , B.Sc., D.Phil.

Head of the Department of Psychology, University of Edinburgh, and Director, George Combe Psychology Laboratory, Edinburgh

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To

The Sacred Memory

of

My Revered Father

INTRODUCTION

Mr Jha has asked me to write an Introduction to this book I do so readily, not only because Mr. Jha is an old student, but also because I believe a book such as this is very necessary at the present time. The older educational psychologies are definitely out of date, however excellent they may have been in their day A great mass of new psychological material, having a direct and important bearing on education, is now available There are today few books which make available for the student of education this material as a whole. There are still fewer written from an impartial and scientific point of view. Hence Mr Jha's book meets a pressing need of our times

Of all social undertakings the education of the young is by far the most important. Upon it depends the future of any society and civilization. The best knowledge available regarding the nature of the process of education itself should therefore be at the disposal of the educator. The science which is responsible for the extension and systematization of such knowledge is the science of Psychology. At one time it was customary to write books on 'Psychology for Teachers,' which presented the main facts of the science, so far as it was thought the teacher could grasp them, in a form so simplified that most of the science was left out It is a profound mistake to suppose that the educator can be adequately served with such distorted rudiments and fragments of Psychology. If there is one person who requires a comprehensive and thorough knowledge of the science it is the educator. Education itself

is not a simple process, but one of the most complex possible. An over-simplified psychology of education, therefore, is calculated to mislead rather than assist.

Of course, one must not expect from Psychology more than Psychology, as a positive science, can give. Psychology cannot determine the ends towards which the educative process is directed. That is the function of the philosophy of life by which we live. It can, however, show us the way in which we may best realize our ends. It can do more than this. It can help us to decide whether the ends we would attain are practicable ends, whether they are consistent with human nature as it is. It can help us to define our ends in terms of concrete thought and action. It can yield us data which will enable us to decide how far any particular end is attainable in any individual case.

There is one more point that ought to be stressed. The attitude of the psychologist and the attitude of the teacher are different. To study one's pupils psychologically is no substitute for educating them. No psychologist ever dreams of making such a claim. The psychological study of one's pupils, and the psychological understanding of one's pupils, however, must underlie all successful efforts at education. The fuller and more accurate such knowledge the better the foundation for the work of the teacher, and the sounder will be his judgment in dealing with his pupils as a teacher.

UNIVERSITY OF EDINBURGH
June, 1933. } JAMES DREVER.

PREFACE

No apologies are necessary for adding a book on the subject of Educational Psychology. There are not too many books on the subject yet, nor have all the different points of view been represented My experience of teaching the subject indicated to me the want of a comprehensive text-book for the students of the Training Colleges Psychology is a fast growing subject, and with the modern developments in its study, a summarization of psychological findings useful to students of Education is necessary It is just this that I have attempted No claims are laid to originality unless it be my own way of looking at psychological phenomena or of summarizing them in the way I consider useful

I should like to make my point of view clear as regards a few matters I have attempted to present what I regard the modern point of view, but this is not to be confused with extreme 'Behaviourism' The correct position to my mind is somewhere between that of the Introspectionist and the extreme Behaviourist. Mind expresses itself in behaviour, but the latter only indicates the former and does not completely determine it The determination of the living being is from within The stimulus-response chain has no meaning without the nature of this determination

The experimental procedure is essential for scientific study, but psychology is a biological science. The psychologist weighs, measures, experiments, and does all that objective study demands; but he experiments with a living organism and not with dead matter. In applying psychological findings, the teacher will do well to remember that the child is capable of self-determination, and must be so dealt with.

A clear understanding of individuality is also necessary. Psychology has helped considerably in bringing the individuality of the educand in the limelight. Mass teaching has been, is, and will remain the practice in education. Apart from practical needs, it is necessary on social grounds. Man is a gregarious animal ; as such he must live in a group. He has to be brought up as a member of society. All this has led to a cry for the socialization of education. But the individual must be respected and given the fullest scope of self-expression. A child's powers and possibilities must be studied. Our school should not let the individual get lost in the herd. Mere routine only subdues the individual.

Individuality is not merely numerical distinctiveness. The potentiality as well as the richness of the experience of a person fused together make up his individuality. It is the self integrated in a wholesome way. Education must help in this integration The educator has to take the help of psychology in proceeding to do this.

The child must be helped to find out his powers and then to build up his personality. The educator has only to provide the opportunity for this creative activity. But while doing so he does not stand aloof. Healthy creative activity cannot be achieved without intervention on the part of the teacher. He has, on the one hand, to subordinate his self, and on the other, to assume the role of the dictator. The task of the modern teacher is, therefore, no less difficult and responsible than that of the ancient savants.

I have distinguished clearly between the emotional and the intellectual activities of the mind. But I must emphasize that they are not two separate compartments. I believe in the essential unity of the mind. The distinction of the two phases is, however, essential and must be adequately understood by the teacher. Systems of education, particularly in this country, have focussed their attention on the development of the child on the intellectual side. It is equally important

to attend to the emotional side of the individual, particularly in the formative stage in the schools. Our schools have to bring out men of learning, but more so they have to produce men of character.

To the works of original thinkers like McDougall, James, Spearman, Thorndike, Nunn, Burt, Drever, Godfrey H. Thomson and others, I am highly indebted I cannot adequately express my gratitude to my teacher Prof. James Drever. He has gone through the manuscript, enlightened me with valuable suggestions, and very kindly written an Introduction to the book ; and above all, he has given me the inspiration which led me to write this book. To another old teacher and my retiring Principal H. Tinker, Esq , I E S. also, I am deeply indebted Occupied with the double duties of the Principalship of the College and the Inspectorship of European Schools, he took the trouble of going through the whole manuscript carefully and polishing it as much as was possible. For his painstaking help so generously given I would record my profound gratitude. My thanks are also due to my friend S N. Chaturvedi, Esq , M A. (Lond), P E S , for help at various stages.

Introduction to the revised edition.

Since this book was first written there has been a considerable advance made in psychological research Many findings of experimental psychology have been found useful when applied to the work of teaching. It has not been possible to incorporate all available material as it would make the book much too heavy. What has been considered essential has been woven in without disturbing the original texture. My thanks are due to my distinguished student Chandra Mohan Bhatia, Esq , M A , B Ed. (Edin.), in charge of Wall Psychological Laboratory at the Local Training College for help at various stages.

Allahabad, Oct. '46. B. N J.

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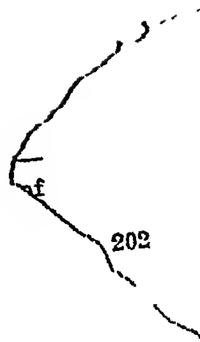
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CHAPTER I

PSYCHOLOGY AND EDUCATION

For the study of any social science the student must have some knowledge of the human mind and the modes by which it operates. The accuracy and completeness of knowledge regarding the principles of any social science must depend on the extent to which the operation of mental forces has been studied In whatever terms we might define psychology there can be no doubt about its being the main science which formulates ascertained truths about the workings of the mind, and helps us in the analysis of all human actions so far as they are psychically conditioned. Education being a social science, it must be accepted that psychology serves as the foundation on which the principles of educational practice must depend.

What is Psychology?

Before considering the exact possibilities of psychology as a help in education, we must first be quite clear and definite about the meaning and scope of psychology as a science or branch of knowledge. Psychology in some form or another has been studied

as far back as the time of Aristotle, but it was not until recently that it assumed the role of a positive science. First it was wrenched out of the bosom of philosophy, of which it originally formed a part. Later, as the element of speculative thinking decreased and objective experimental investigation increased, it gradually developed into a positive science.

Originally by psychology was meant the study of 'soul' and hence it was regarded as the science of the soul. The conception of human nature as being made up of two things, body and soul, dates back to the Platonic period. Plato's 'soul' was 'a being of a nature radically different from that of material things, incapable of being perceived by senses but only to be grasped by the intellect.' Aristotle regarded it as a sum total of vital functions. It was this peculiarity that distinguished it from inert things. According to him a being functioned as he had a soul. It was connected with the body, but how and whether it functioned after the dissolution of the body he could not say. The study of the soul, its nature and functions, remained the object of psychological study right up to the time of even Descartes.

According to Descartes the bodies of animals and men differ in no wise from material things. They are only complicated machines whose working can be explained through mechanical principles. Man alone has a soul, and this exercises the higher mental functions of thought and volition. Psychology as the science of the soul could not make headway as the conception of the

soul remained much too vague and speculatively hypothetical.

Next, philosophers called it a science of 'mind'. During the middle ages, the mental and spiritual aspects of the soul had become separate subjects of study. The psychologist emphasized the mental and the theologian the spiritual Pomponazzi, an Italian philosopher of the Renaissance, emphasized that the intellectual soul essentially depended on the body both for its existence and for its intellection It could neither exist nor operate without a corporeal organ. As a science of mind, psychology remained confused and mixed up with logic Mind having remained an undefined object, psychology as the science of 'mind' made hardly any advance, just as it had in earlier days made little progress when considered as the science of the 'soul'

Psychology shortly after losing the 'mind' made another stride and began to be treated as the science of 'consciousness.' Although Descartes, and to a certain extent Pomponazzi, are regarded as the founders of modern psychology, it was Vives the Spanish philosopher who cut the Gordian knot He set out to inquire into the special properties of the intellectual soul or the mind. According to him the business of psychology was not to study the nature of this soul but to attack another fundamental problem, *viz*, 'what is the relation of the mind and the external world, and what are the relationships of the elements of consciousness to one another?'

Descartes' philosophical conception was that mind or soul existed but its essential attribute was thought. Over this was the objective world extending in space, and these two—thought and objective world—were related to one another. Psychology proposed to discover and study this relationship. While distinguishing between matter and spirit, body and soul, he tried to bring them together by attempting to trace a relationship between them. It may be recalled that the earlier philosophers tended to create a gulf between them instead of attempting to bring them together. He defined mind as extended thinking substance whose essence was consciousness. According to him and to Vives the study of consciousness then became an important matter.

Consciousness was studied in different ways, and various interpretations were given to it, the most common being that of 'awareness' We are most conscious when we are wide awake, and when we are asleep we are not conscious at all. The degree of consciousness increases as we pass from a dreamless sleep to a condition of complete wakefulness. How was this consciousness to be studied or known? It could be studied only with the help of introspection. Every individual's consciousness being his own, introspection was a private affair, and the study could only be subjective and speculative. We have immediate knowledge of our own consciousness only. Of others it is inferred. Hence the method is that of analogy, and not sound. Psychology

as a science must generalize about all, and this method surely cannot achieve that. Again, relying on the method of introspection, it would be impossible to study the psychology of children and animals. The study of mere consciousness has yet another difficulty. Even if we could obtain a complete description of the consciousness of one individual or of all we should not be able to constitute a science; because as a science, psychology will have to define why any particular consciousness takes the form it does, and how it can be controlled or utilized to the best advantage of man.

The definition of psychology as the science of consciousness, beset as it was with difficulties on all sides, had to be discarded, although the word 'consciousness'[1] under different interpretations still finds place in psychological literature It is an unfortunate word, in so far as it rarely represents a specific mental phenomenon,

[1] See McDougall *Outline of Psychology*, page 16 —" 'Consciousness' is a thoroughly bad word, and it has been a great misfortune for psychology that the word has come into general use If it be used as synonymous with 'experience' it must be admitted that 'experience' is much the better term, because even when it is used in the substantival sense, it retains the form of the verb from which it is derived, so that we can hardly forget that experience implies someone who experiences and something which is experienced by the experiencer. Whereas 'consciousness' having the form of a substantive which cannot be used as a verb, allows us to forget that it stands for the fact of being conscious of something, and that it implies someone who is conscious of something. And many of the writers who use this word allow themselves to fall into this error, though the etymology of the word should help them to avoid it For it is derived from 'Conscire,' which is the Latin for 'to know things together' and consciousness if it is used at all should be used to mean 'the act of knowing or thinking of things' The word 'conscience'

and its use often involves the issue in the interpretation of a mental process.

Psychology having lost its soul, mind, and consciousness took another turn and began to be regarded as the science of 'behaviour.' Since people when they were conscious did things, reacted, and behaved, the study of consciousness through behaviour began to be regarded as most useful. Psychology as the study of behaviour has been the modern trend, and although 'behaviourism' as a school in psychology is questioned and is questionable, it has influenced considerably the educational psychology of the present time.

With the introduction of the behaviouristic standpoint in psychology the connection of psychology and education became rather intimate. None of the previous notions of psychology, depending as they did on pure introspection, could be of much value to the educationist. One had to agree with James who felt that only certain fundamental conceptions of the then psychology could be of any real value to the teacher. Stout did not feel any more hopeful than that when in his analytic psychology he mentioned the important principle of communicating new knowledge to the educand's mind as a development of previous knowledge, as the only one which could be derived from psychological knowledge to the benefit of education. Herbert's

would have been a better word than 'consciousness' for psychological purposes if it had not been appropriated by the moralists and given a special popular meaning. The French language is more fortunate than ours, in that it retains the word 'conscience' in its original sense."

principle of apperception may, perhaps, be regarded as the highest achievement in attempting to apply psychological knowledge to principles of education in the pre-behaviourism period

The introspectionist could at best obtain the account of the mental life only of an adult Having only such knowledge an educationist could not but start with the assumption that the child was a miniature adult To look at the mental processes of the child as merely the diminutive forms of those of the adult would surely be a worng line of thought A child is a child possessing mental powers and carrying on mental processes characteristic of his own nature His desires, needs, wants, reactions, and behaviour, in fact, his whole mental outlook cannot be assessed on the basis of what the introspection psychology of the adult would furnish us. A child is not a small model of man that merely has to grow in proportions to reach manhood There is distinctly a process of mental evolution that takes place as the child develops into an adult An educationist who wants to be successful has to study children and not men It was only the behaviouristic psychology that showed the road to this study—the study of the behaviour of the organism whose mental processes were to be known, whether it was a man, or a child, or an animal. The results obtained by the direct study of the behaviour of children have considerably influenced the principles of teaching and training at the present time

Several educational psychologists belonging to the American school uphold extreme behaviourism. Of course, the views of individuals differ according to the interpretation of the basic terms employed, such as mind, mental events, experience, consciousness, behaviour, and also due to the role attributed to these in the functioning of the organism. Behaviourism has developed to extremes, particularly in the hands of psychologists with a distinct physiological bias as in the case of Pavlow (his treatment of conditioned reflex), and has begun to tread most contentious grounds. Extreme behaviourism doing away with introspection altogether (even where it serves a legitimate and useful purpose) has been disputed by the British school of orthodox psychologists who propose to interpret mental phenomena in psychical rather than purely physiological terms. The behaviour of the living organism reacting to its environment in a purposive way, because it is psychically conditoned, must primarily be interpreted so.

Schools of Thought

With the rapid advance of the science of psychology various schools differing in their standpoints and outlook have sprung up A few of the more important may briefly be mentioned. Broadly speaking, four main schools may be recognized—Structuralism. Functionalism. Behaviourism, and Motivism.

In Structuralism the study of every mental phenomenon is made just from the point of view of its momentary constitution It consists in the analysis of the momentary and transient states of consciousness into the various primary elements of which they are made, after the fashion of the analytical chemist who gets to the elements After the analysis is complete classification is possible. Then just as the chemist obtains a compound by combining elements, the structural psychologist obtains the complex mental states

It might be worth while mentioning here that as a revolt against this psychological atomism, and partly against the stimulus-response theory (which we shall discuss later) a distinctly new phase has been introduced into the structural psychology by the theories of the 'Gestalt' school under Koffka, Kohler, and Wertheimer in Germany 'Gestalt' in German stands for 'configuration' According to this theory, our mental experience cannot be regarded as being made up of such separate elements as sensations or images or any such thing Separate sensations do not exist It is only 'undivided articulated wholes' called 'configurations' that exist. Any cross-section of our experience is a structural whole, and the whole is more than the sum of its parts The perceptive process does not consist merely in a sort of chemical synthesis The experience is a result both of the stimulus and the reacting organism which has a constitution of its own The setting, the background,

the attitude of the organism play a part along with the stimulus.[1]

The functionalist starts mostly from the biological standpoint. He does not study the mental phenomena from the point of view of their composition. To him the significant part is the adjustment. In its mental life how does an organism adjust itself? That is his problem. Functionalism concerns itself with the dynamic aspect of the process, how the mind operates, how it adjusts itself from moment to moment It is not concerned with the constitution of these changing states

Behaviourism starts with the object of studying behaviour as objectively observed It has no sympathy with the subjective approach to the study of mental phenomena Behaviourism arose out of the weakness of pure subjective study, and depended on the fact that a man's behaviour was the index of his consciousness But, as we have said before, behaviourism has gradually developed to such an extreme type that it could be designated psycho-physiology According to this view, the whole chain of mental events can be reduced to some such string of facts—first of all movements are aroused in the living organism, then there is the adjustment in the nervous system, and finally results the reaction.[2]

[1] See OGDEN'S *Psychology and Education*, pages 113-14

[2] See MCDOUGALL: *Outline of Psychology*, page 23 —"All human action is made to appear to be of the type of reflex action, to be the issue merely of the play of nervous currents, started in the sense-organs by stimulations from the physical world and propagating themselves through the jungle of the nervous system, finding always the paths of least resist-

According to Watson 'thought becomes a speech habit and thinking becomes implicit habit responses.'[1]

In Motivism, which looks at mental acts from the teleological point of view, all psychic action originates in the actor rather than in the environment. According to the stimulus-response theory of behaviourism, the person reacting is more or less akin to a reflex machine. The stimulus is the starting point, then connections are established in the complicated nervous system, and the behaviour of the individual is the end point. According to Motivism conduct has its starting point in the life interests and life impulse of the organism. The inner drive is the primary, the stimulus is the secondary affair Consequently, the starting point is the purposive attitude of the organism, the stimulus is the occasion for the activity, and behaviour is the end point again. The motivist would say. 'The stimulus is not primarily provocative of mental life We ourselves are' The psycho-analytic school adopts the extreme motivistic point of view when it pleads that the mental activity takes its start in the 'unrest of the inner self'

The orthodox psychologists partly agree with the motivists and partly with the behaviourists. In their interpretation of mental phenomena and the operation of innate tedencies, etc, they emphasize the teleologi-

ance according to purely physical principles All human action is reflex action, or, as the principle is more commonly formulated, every human action is a mechanical response to a stimulus'

[1] WATSON Psychology from the Standpoint of Behaviourist Chapter XI

cal poit of view. They agree with the behaviourists in so far that the behaviour of the organisms, man, child or animal is an object worth study, and it is from the field of behaviour that all matters for study can be obtained. They thus favour all objective and experimental study which is the characteristic mark of psychology as a positive science at the present time But they insist on regarding the living organism as self-determining in its behaviour, and also on interpreting their observations and results in psychical terms. According to McDougall:[1] "The psychologist has to build up his description of the human mind by inference from the observed facts of behaviour, the behaviour of men and of animals, and from the observed facts of experience, facts of his own experience observed introspectively and facts of others' experience described and recorded by them." And Drever[2] defines psychology as "the science which takes as its field of study the behaviour of living organisms so far as it is mentally or psychically conditioned, and can be interpreted in mental or psychical terms."

Whatever the schools of thought in modern psychology there is one aspect of the mode of study which characterizes them all. It is this: that all work in modern psychology is dominated by scientific attitude and aims. The aim of science, according to Lloyd

[1] McDougall: *Outline of Psychology*, page 38

[2] Drever: *Introduction to the Psychology of Education*, page 1

Morgan, 'is to develop a generalized interpretation of natural processes in all their relations.' Now psychology as a positive science has been trying to achieve this, and has, consequently, turned away from the old path of philosophical speculation. Like any science, it classifies facts, notes their sequences and relationships, and draws conclusions unbiased by personal whims. It has ceased to be hypothetical. It demands objectivity and experimentation The findings of experimental psychology, which of late has developed as the chief method of study, have considerably helped the interpretation of all psychical phenomena. While introspection cannot be said to have been done away with (except in the case of extreme behaviourism) it has been restricted and controlled Where available it is taken into account, because a science, however objective, must take into consideration all factual materials available.

Place of Psychology in Education

Having briefly surveyed the growth of modern psychology we now consider the place of psychology in education Education being a social science, and having to do with the training of the child-mind, is interwoven with psychological findings, and has to depend on them for what it does, and how it is done. Education has to deal with the springs of human action, the impulses and motives that sustain and regulate all mental activity and behaviour of children, so that they may be influenced in such a way as to develop into the right type of adult

members of a community. Now modern psychology not only claims but has definitely been able to interpret and define the course of the impulses and motives which subserve the various intellectual processes so as to help all social sciences—education, economics, political science, religion, etc

Assuming then that psychology is a help in education we have to define the nature and scope of this help. One of the weaknesses of the extreme view is to imagine that educational theory is nothing but psychology, and that for whatever education does or seeks to do it must obtain the sanction of psychology. Education is a process, a social function carried on by and in society for its sake. Now every activity in so far as it is a process must certainly have aims and ends in view of which it is carried on. In other words we have to answer the question: 'Why do we educate?' How far can psychology answer this? Psychology in its widest scope, as we have defined it, gives us no aid in answering this question since it is not a normative science Again, in every activity or process besides defining the end and purposes, in view of which we carry it on, we have to analyze the other aspects of the process. We have to answer the questions: 'Where is the process carried on? Who is affected by the process? And how is the process carried on?' Referring to education these questions reduce themselves to: 'Where do we educate? Whom do we educate? And how do we educate?' How far psychology helps us in the solution of these

questions is what we have to see We already referred to the inability of psychology to help us to answer the primary question—why do we educate? Ethical, religious, and sociological issues are mixed with this question of aims and purposes. The fact that education aims to produce a good, happy individual, who can acquit himself satisfactorily in society, does not depend on psychological findings. This part of educational theory has to be dealt with by philosophy or ethics. The question—'whom do we educate?'—needs no answer as the educand is the fixed being The third question—'where do we educate?'—refers to locality and institution, and is primarily settled by society which seeks to educate in its own interests The last question—'how do we educate?'—is probably of the greatest import to the educator since it refers to methods of education Such means and methods have to be devised as shall make the process of education successful so far as its conduct is concerned; and it is here that we cannot go a step forward without the aid of psychology "The aims are determined by the philosophy of education, the methods must be devised by a science of education which has to be psychological"[1]

In the older methods of education psychology played very little part, owing partly to the insufficient development of the science itself and partly to a wrong point of view from which the process of teaching was considered The factors involved in the process, *viz*,

[1] DREVER *op cit*, page 4.

the material to be taught, the educator, and the educand occupied different degrees of importance at different times in the history of the evolution of the principles of teaching. In the older methods the subject-matter and the educator were supposed to play the important parts. The role of the educand was simply that of an originally empty vessel passively receiving something. With the advance of psychology discovering the basic principles of human actions, motives, and behaviour, the educand began to loom larger and larger. The part that the child as a living organism capable of self-determination (according to the laws of its own nature) during its behaviour, could play was fully realized. The result was that the comparative importance of the three factors changed positions. The educator engaged in the task of directing and training the young personalities needed to understand their mental powers and processes. And as Sir John Adams put it, the teacher of Latin had not to know merely Latin, but John also whom he taught. John having gained in importance, the necessity of basing methods on a psychological foundation became imperative.

We have developed our argument to establish the fact that while we keep the aims and purposes of education outside the government of psychology we wholly yield the methods to it. This makes it clear that we give a very important place to psychology in our theory of education and principles of teaching, and depend largely on it for our success Now those exponents of

psychology who desire to place its significance and value in education on a still higher basis, argue that even in the determination of the aims and purposes psychology is of help in so far as it determines whether on a psychological basis the achievement of those aims is possible or not. Psychology has studied individual mind as well as group mind. It has claimed to lie at the base of the social and political laws and principles of conduct at least in determining whether in view of the existing data they are psychologically possible or not. And thus far even the determination of aims and purposes must seek the aid of psychology. That amounts to saying that psychology is the basic and master science of education

It must, however, be confessed that the claims of psychology are carried by some so far as to appear exaggerated The philosopher could safely ask—Can psychology with all its knowledge of human behaviour, motives, and stirrings of the mind distinguish between 'good' and 'bad,' or pass a verdict on Plato's 'Highest Good' or Aristotle's 'Table of Virtues'? It can at best only say whether an individual person, framed as he is, circumstanced as he is, can under the influence of the existing conditions achieve or not achieve a certain principle or ideal of conduct It can pass no verdict on whether a principle of conduct is virtuous or otherwise. We have to repeat again "It is a positive science and not a normative one" It cannot lay down ideals for conduct The aims must, therefore, be held by philosophy But the aims, once determined, the process

of education is entirely at the mercy of psychology; and no other social science has in recent years been so much benefited by psychology as the science of education.

References for further reading

1 DREVER: *An Introduction to the Psychology of Education*, Chapter I
2 McDOUGALL: *An Outline of Psychology*, Chapter I
3 " *Psychology: The Study of Behaviour*
4 BALDWIN: *History of Psychology*
5 STOUT: *Manual of Psychology*, Chapter I.

CHAPTER II

METHODS OF MODERN PSYCHOLOGY

HAVING surveyed in brief the development of the science of psychology, and having established the claims of the science to have an important bearing on the science of education, it is necessary to discuss the methods of study which modern psychology adopts, and to see how far they have been utilized for educational purposes. The progress of psychological investigation has been very rapid particularly during the last fifty years The application of psychology has been recognized in so many directions that a number of branches of psychology have developed Educational psychology is one of the important branches that may be recognized.

BRANCHES OF PSYCHOLOGY

Starting with two main divisions, the normal and the abnormal, it is possible to define several branches under each. In normal psychology, the modes of behaviour and mental processes of normal beings—human beings and even animals—are studied Abnormal psychology concerns itself with investigating into the behaviour and mental processes of human beings when they are under morbid or abnormal mental conditions. It is, however, very difficult to draw a line of distinction

and say, "here normality ends and there abnormality begins." But then it is possible for the society to sort out a lunatic from normal men and send him to the asylum. There are various degrees of lunacy and some overlap with the characteristics of a normal person's behaviour. And then it depends on the propensities of the classifier too. The lunatic, the lover, and the poet go together. The saint, the philosopher, and the lunatic are sometimes all classified under abnormal.

Most of the branches of psychology deal with the normal, but some have developed also under abnormal, *e.g.*, criminal psychology, pathological psychology, etc As applied to education even, certain sub-branches of educational psychology pertain to abnormal conditions, *e.g.*, the psychology of youth delinquency and mental deficiency. The following tables indicate some of the important branches:—

NORMAL PSYCHOLOGY (HUMAN)

- Pure Psy.
  - Analytic Psy.
- Individual Psy.
- Group Psy.
- Social Psy.
- Applied Psy.
  - Education Psy.
  - Industrial Psy.
  - Psy. of religion

ABNORMAL PSYCHOLOGY (HUMAN)

- Group psychology
- Individual psychology
  - Criminal psychology (adult and child)
  - Clinical psychology.

(Experimental psychology as a method is applied both to normal as well as abnormal psychology.)

With the advance of physiological and biological knowledge an important branch called animal psychology, or, better, comparative psychology has sprung up. Comparative psychology, studying as it does the processes of learning and the behaviour of animals on a purely experimental basis has made considerable advance, specially in America. It has also begun to bear some influence on educational psychology in so far as some of the laws of learning and such other things, derived from experiments on animals, have been successfully employed in the case of school pupils.

It is necessary to discuss briefly some of those branches that are helpful and have a bearing on educational psychology. Pure psychology, except in so far as it touches the original nature of man, has not much use But this aspect is necessary in order to understand human tendencies and capacities. The child possesses certain capacities The educator can neither add to nor subtract anything from them They are individual tools But a knowledge of the extent to which these traits and powers are possessed, guides the teacher considerably in training the child Educational psychology studies the variability between children, and thus helps the teacher to know the exact equipment of his pupils. The child possesses certain native tendencies which are termed instincts These are possessed by all, and educational psychology derives from pure psychology knowledge of such of these as play a prominent part in

the process of education. With this knowledge he can use, modify, and adjust these tendencies so as to benefit the growing child.

From group psychology the educationist draws an account of the various characteristics of social groups. The child is educated in a group. He lives, learns, and grows at school, and his behaviour is codified by, and in turn modifies the group in which he lives. The important features of mental acts, their motivation and their conduct in a social group, as different from individual behaviour, throw a flood of light on the work of the educator. Educational psychology again derives help from individual psychology, in so far as the latter places at its service its findings on differences in the behaviour of individuals as such Some of these differences are due to sex or race and are of great help to the educator.

Lately abnormal psychology has been found to be of considerable aid in certain specific matters of educational psychology. It deals with the mental changes due to desires, disorders, or abnormal mental bodily conditions. Of the multifarious aspects of the abnormal mind which it studies some of those which deal with deficiency, delinquency, dreams, mental immaturities, perverted sensations, perceptions, memories, and connotations have a great bearing on the educational problems of the backward, the mentally deficient, and the delinquent child.

As referred in the previous chapter the methods of the old psychology were introspection and speculation.

Standing on these two supports psychology could not possibly develop as a science Speculation has no important place in science, and introspection as the sole method has been questioned since psychology has assumed the role of a positive science. In fact, by one modern school of thought it has become altogether taboo. Whether it has a place, and, if so, to what extent depends on the methods adopted by the individual psychologists, and we shall presently define a position which after all does not appear to be extreme.

INTROSPECTION

Introspection is the process of looking inwards into our minds. It is a sort of self-observation in which we observe, analyse, and report our own feelings, and in fact all that passes in our minds during the course of a mental act. The method of the old psychology in arriving at the nature of any mental process was to obtain introspection, which generally with philosophers was self-observation and not introspection of another, and on the basis of that to generalize its nature. This was a typical subjective method, and every hypothesis or theory consequently depended upon individual speculation with hardly any factual data, on the basis of which conclusions were drawn. Apart from being subjective introspection as a method could neither be sufficiently accurate nor easy To expect any individual (oneself or another) to attend to the workings of his own mind during a mental process, specially a complex or emo-

tional one such as anger or fright, is a mistaken idea. For then as Ross[1] says: "The observer and the observed are the same, the mind is both the field and the instrument of observation." While a mental state is being experienced the subject has his attention in the process. How can he then simultaneously attend to introspection? "The mind in watching its own workings," says Stout, "must necessarily have its attention divided between two objects—on the one hand, the mental operation itself which is to be observed; and, on the other, the object to which this mental operation is directed" Another difficulty that arises, and especially in the case of an emotional state, is that the act of observing does not allow the emotional state under observation to remain exactly so. It tends to change it A man who is angry or afraid cannot exactly see what is going on in his mind and remain unchanged in his state of anger or fright.

From other points of view also introspection is a very inadequate method. It is only normal human beings who are adults that can introspect to any useful extent Children's introspections will be very incomplete and unreliable; hence it is only adult psychology that can have real help from introspection. A child psychology cannot be built up on that basis. Then again, introspection is impossible in the case of abnormal human beings or in the case of animals. Introspection has also the danger of being biased and

[1] Ross: *Groundwork of Educational Psychology*, page 18.

rendered unreliable even in the case of adults when they are at such a level of thinking that they would unconsciously put in knowledge into their introspections When psychologists and philosophers are themselves the subjects, a modification and enriching of introspections takes place, a defect so clearly marked, for instance, in the experimental psychology of thought processes where psychologists of renown worked as subjects.

All this makes the position of introspection as the sole method in psychology, which is a positive science, rather untenable Behaviourism going to extreme objectivism has done with it, but the orthodox modern psychologists find a place for it. They regard it as helpful in furthering and comprehending the observations obtained in psychological experiments. The understanding of the behaviour exhibited by a subject is rendered complete by the consideration of the introspections given by him after the experiment is over. Hence while realizing the weakness of introspection as the sole basis of psychological conclusions, it seems advisable to derive help from it in at least those experiments which deal with inner drives and feelings. In pure objective experiments as in animal psychology it has of course no place

Modern Experimental Method

We have seen already that the viewpoint of modern psychology is that of an objective science It

is thus similar to other sciences, particularly the biological sciences and the methods employed by it are, like the other sciences, the methods of experimentation.

In every science, as far as possible, knowledge is obtained first hand. The means adopted to obtain knowledge are devised to suit this point of view. After the knowledge is obtained, it is systematized and organized. For obtaining knowledge science does not depend on hearsay methods or speculation Science depends on factual data obtained from observations. The methods followed are observation and experimentation. Taking a wider view, observation is the general thing of which experiment is a special form. When observation is controlled and ceases to be general we have an experiment. Psychology employs both observation and experiment. General observation as a method is employed considerably in child study, specially in the observation of play habit and the general behaviour of babies. For instance, Miss Margaret Drummond's observations[1] on her little niece Margaret have formed a basis for a good thesis on how the child-mind dawns. But, side by side with observation, experimentation has to proceed The field of observation has to be limited and controlled by a device which we call an experiment in order to study specific matters and draw conclusions regarding them.

The experimental method consists essentially in the recognition of the interconnection of the human

[1] DRUMMOND *Five Years Old and Thereabouts*, page 12 Also see Valentine: *The Psychology of Early Childhood* (Methuen)

organism and the external world The essential principle of the method is to place a human individual in a certain situation and to note how he reacts therein. It is on the basis of his reaction in relation to the situation in which he has been placed that the laws of objective psychology are derived Woodworth has presented the viewpoint as the Stimulus—Response chain which is represented graphically as —

$$S \longrightarrow R$$

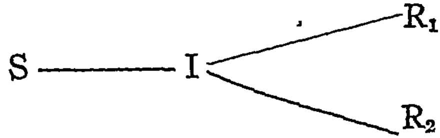
where S is the stimulus presented to the individual or the situation in which he has been placed and R is the individual's reaction to the stimulus or the way in which he behaves in the situation The essential task of psychology, then, is to trace the course from S to R and to state the routes from S to R under various circumstances.

While carrying on objective and experimental work on these lines, it is easily recognized that the position is not quite as simple as represented by the original diagram of Woodworth Experimental psychology, while it adopts the methods of experimental sciences, has to bear in mind that its 'subjects' of study are different from the 'objects' of study of other sciences. It cannot leave out of consideration the fact that an experiment in psychology is performed on a subject who is a living being The living organism has got certain characteristics, and the experimenter must needs take these into account both in the conduct of the experiment as well as the interpretation of the results.

Drever[1] defines a living organism "as a self-maintaining system of activities and forces, which is self-determining both in respect of its own development and in respect of its reactions to the external environment" (A definition which, as we shall see later, touches the very heart of the educational process by pointing out to the teacher a specific way in which alone the child as a self-determining being is to be handled in the whole business of teaching and training). Being a living system of activity and forces, it cannot lend itself to be manipulated for experimental purposes simply as a mass of material substances which has acquired a complicated structure. The experimental psychologist, unlike the physicist or the chemist, in trying to control the conditions of his experiment, cannot ignore the existence of life-force or vitality which an organism possesses Again, the living organism, being self-determining in its reactions, reacts on the basis of its inner wish rather than owing to external conditions. The external conditions become only occasions for its particular reactions The experimental psychologist cannot lose sight of the time honoured saying, "you can take a horse to water but cannot make him drink." He has, in other words, to depend on the co-operation of his subject, whether an adult, a child or an animal. In view of these considerations, the conditions of an experiment in psychology have to be represented schematically in a rather more complicated form than

[1] DREVER · *An Introduction to the Psychology of Education*, page 8.

the simple "Stimulus—Reaction" chain Woodworth has accordingly presented a modified scheme of the state of affairs in an experiment in psychology as follows.—



The stimulus S influences the individual I, who, possessing his own initiative and urge, reacts to the stimulus in either of a variety of responses R_1, R_2, ... etc Hence the task of Experimental Psychology is the complicated one of tracing all the connections between S, I, R_1, R_2, .etc It will thus be evident that the laws of psychology are generally not as simple as those of physical sciences and as some of the extreme schools of psychologists themselves, particularly the Behaviourists, would have us believe

Experiments in psychology are conducted according to a well defined plan Before commencing an experiment, the particular aspect of the mind that is to form the subject of study is decided upon This is usually known as 'isolating the problem' or 'the selection of the topic' It may be pointed out here that although the unity of the mind as such is unquestioned, it is essential for the purpose of gaining proper information that the scope of our investigation and experimentation should be limited Thus a particular aspect of the mind only, such as memory, or association, or fatigue etc., is mostly in focus at one time. We aim at a clear and

well defined objective with reference to which we study the mind of the individual.

The aim of the experiment having been decided upon, the next step is the selection of the individual or individuals who are to serve as the subjects of study. In the case of routine experiments performed in the class-room this does not possess much difficulty, as an individual who is closely associated with the experimenter is usually taken up as the subject. The two individuals, then, are generally known as the 'Experimenter' and the 'Subject'—the one who performs the experiment and the one who is the subject of study, respectively. Sometimes, a whole group of individuals. such as all the students in a particular class may be simultaneously taken as the subjects Since, in this case, the whole group is taken up for study, the experiment is often called a "group experiment". The Instructor, here, usually acts as the common experimenter to all the subjects.

When the experiment is not an ordinary experiment in the class-room, great care has to be taken in the selection of the subject or subjects. A single subject is usually not sufficient to obtain valid generalizations, unless it be the purpose of the experiment to study the peculiarities of the individual himself, as for example in the case of certain problem children. In selecting a group of subjects, particular attention is paid to make the group representative of the class of individuals for which the results are to be valid. This is expressed technically by saying that the group should be an "un-

selected" one. The non-selective nature of a group is generally ensured by including in it a number of individuals not possessing any particular bias

The next important step in an experiment is the setting up of the necessary apparatus or the arranging of the necessary material In many experiments, mere paper and pencil for use by the subject and a stop-watch for the experimenter are sufficient. In others, simple apparatus and material are all that are needed, as for example in investigating the performance abilities of children and adults, cubes, boards etc., are employed But in the advanced experiments of modern psychology, the apparatus needed is often quite complicated In studying the changes in the electrical resistance of the skin that accompany different emotional states of an individual, the complicated electrical apparatus known as the psycho-galvanometer is used Again for example, in studying the technique of reading and the accompanying eye-movements of an individual, complicated photographic apparatus has to be set up in order to ensure accurate observation and their automatic recording.

The experiment as such commences when the subject has been mentally placed in the particular situation in respect of which he is being studied. In a class-room experiment this usually means giving the subject instructions to do certain things For instances, in experiments on learning, or on memory, the subject has to learn a new situation or memorize a new lesson. In certain other experiments the subject has only to report

his reactions to the stimuli presented, just as in the experiment on Free Association, the subject reports his free reactions to the stimulus words provided for him.

The observations to be recorded in an experiment in psychology fall under two headings. Firstly, the experimenter notes all the external reactions which he is able to observe in his subject. These form the basis for arriving at generalizations and are truly objective in nature. For example, in an experiment on the Learning Process, the times taken and the errors committed in successive trials by a subject are recorded and conclusions derived from them. Such observations easily assume a quantitative form Statistical treatment of such data is thus both possible as well as extremely desirable.

The second type of observations in a psychological experiment consists in the subject's independent report of all that passed in his mind during the period of the experiment. This is usually known as the introspection of the subject. It is defintely subjective in nature, but nevertheless is very helpful in understanding the total mental reaction of the subject to the situation. It is always recorded in the case of adult subjects.

Psychological conclusions are arrived at on the basis of both the sets of data taken together, which are thus not antagonistic to one another but are rather complementary. Myers has summarized the whole situation thus: "The subject responds to a psychological experiment by undergoing changes in inward experience or in outward action, usually in both ways "[1]

[1] Myers· *Text Book of Experimental Psychology*, Part I, Ch I, p 2.

A general remark about the experiment in psychology is also essential It is essential that the attitude of the subject should be that of perfect cooperation and that he should approach the experiment with an unbiassed mind Carelessness or inattention or apathy on the part of a subject will greatly vitiate the results in a psychological experiment and should be carefully avoided Similarly preconceived notions about the nature of the results to be expected are also injurious to the proper conduct of an experiment Generally, however, a normal attitude on the part of the subject is also a natural one and will be easily obtained. In certain particular experiments, for instance those on suggestion, the experimenter will have to arrange the experiment beforehand with great foresight.

Psychology has been almost the last of the sciences to develop systematic experimental methods Wundt, who has been called the father of New Psychology, started the first psychological laboratory at Leipzig in 1879 This may be regarded as the time when systematic laboratory work started, although a good time before it some experimental work on purely sensational aspect of experience had been going on. Fechner's is the most important name in this connection. Fechner had restated Weber's Law on sensations that opened a field of work for what are now known as the psycho-physical methods of experimentation in Psycho-

logy. Wundt's laboratory at Leipzig gave an impetus to this aspect of experimental work in Psychology and opened up fresh fields of investigations The work that began with the study of sensations assumed considerable magnitude and the progress since the commencement of the present century may be regarded as phenomenally rapid.[1] Almost all problems of general psychology have been tackled To mention a few directions of work—types of associations, functions of attention, problems of perception, operation of feelings, problems of fatigue, functions of memory, methods of learning, imagination and thought processes etc.—have all been studied with human subjects. Experimental work on the study of babies and young children has been most remarkable and the practical tool of mental testing is now in the hands of the teacher. In the sphere of animal psychology, most ingenious experiments have been performed on the learning of animals, and these have thrown light on the general learning process too All this work has not been restricted to one country or school of thought Rapid work has proceeded in different countries *e.g.*, Britain, Germany, America, and several others in the West Experimental Psychology is taking root in eastern climes too, for instance, South India promises to lead the light in this country; and at least in one Training College for teachers—the Government Training College, Allahabad—it has been introduced as a regular subject of study.

[1] WOODWORTH· *Experimental Psychology* (1939), page 111

Of the various problems tackled, those having to do with the laws of learning as defined by Thorndike, those on imagery and various types of it, those on methods of memorizing, those on the formation of association etc , have been widely applied in determining principles of education as would be seen in the later chapters. The findings of experimental psychology, besides having improved the methods for the normal average children at school, have also helped the teacher in dealing satisfactorily with the backward, or the deficient, or the emotionally deranged or the delinquent child Besides mass examination of children of school, individual examinations of special cases have been carried on after the clinical methods [1] so often employed in medical science In all advanced countries, a psychological clinic for each educational centre is a regular feature of educational organization. In England, the National Institute of Industrial Psychology, London [2] (till lately under the directorship of Prof C. Myers F R S) acts as the central body for tackling psychological problems on a nationwide scale, and similar national organizations exist in America and other countries The aims of all these organizations is to study objectively the individual child, so as to lay down lines of instruction which will be most suitable to the needs of the individual child, whether normal or abnormal.

[1] WALLIN *Clinical and Abnormal Psychology* Pages 13-14

[2] Consult the INSTITUTE'S JOURNAL *Occupational Psychology*

References for further reading

1 WOODBURNE. *Human Nature and Education*, Chapter I

2 SANDIFORD: *Educational Psychology*, Introductory

3 MYERS *Experimental Psychology*, Part I, Capter I.

4 COLLINS AND DREVER: *Experimental Psychology*, Introduction.

5 WALLIN. *Clinical and Abnormal Psychology*, Part I, Chapter IV.

6 WOODWORTH: *Psychology*, Chapter I

7 WATSON *Psychology*, Chapter I.

8 RUSK: *Experimental Education*, Chapter I

9 WOODWORTH: *Experimental Psychology*, Preface and Chapter I.

CHAPTER III
HEREDITY AND ENVIRONMENT

THE relative value of the two factors, heredity and environment, in education has all along been a matter of contention. With heredity all important the task of the educator is reduced to one of insignificant importance. With heredity reduced to a negligible value, and environment made the all-important factor, it would seem as if the impossible can be made possible by the agency of Education. It becomes necessary for the educator to explore the possibilities of these two factors so that he may be rightly guided in his task of educating the young A good deal of adjustment of educational principles depends on the extent to which the influence of the one or the other factor is recognized.

The old saying that "You cannot make a silk purse out of a sow's ear," if rigorously followed, makes the educator very despondent Ancient pedagogy working blindly on this assumption, finding a child dull gave him up as hopeless The modern while certainly unable to make the less intelligent more so, or the less capable more capable, advocates the necessity of giving each one the best chance of self-expression Psychological findings on the nature of instincts and the possibilities of their organization by the latest thinkers like McDougall, Drever, Thorndike, Shand, etc., have made

the teacher's task much more hopeful. The dynamic power of these in building up the character and will-power of an individual has told the teacher as to the best he can make of the children in his charge so that they may be successful in life Recent findings on the nature of innate intelligence and the methods of measuring it in children have also helped the teacher in getting an exact idea of the material to be educated. Thus the teacher in modern times has begun to work on surer grounds and adopt lines of procedure likely to yield more satisfactory results. To the consideration of this we shall return again in another chapter.

In order to understand the influence of heredity we have first to study its mechanism in view of the light thrown on the question through the studies of scientists, particularly biologists such as Darwin, Mendel, Weissmann, Lamarck, etc. The evolution theory has been considered the landmark of the study of heredity, and no educator can reach a clear conception of the mechanism of this great factor without understanding the exact significance of the evolutionary basis.

Heredity

Heredity is rather peculiarly understood by the man in the street. To him it is just an unanalyzable superhuman force which produces offspring of the same type as the parent. The element of likeness is emphasized A son resembles the father because of heredity. According to this casual view resemblance alone is included in heredity. Why the son differs from the

father is not what the common man worries about Heredity is not that alone which brings about likeness. Likeness and unlikeness both are included in it. Variation is as much due to heredity as resemblance Heredity is the sum total of inborn individual traits.

Biologically it has been defined as the sum total of the traits potentially present in the fertilized ovum. As soon as the parent cells—spermatozoon and ovum—have met and the ovum fertilized, it is then and there determined whether the individual to be born will be a male or a female, will be tall or short, will have brown eyes or black, will be intelligent or dull What dynamic forms the native features and capacities will take, how far they will find expression, will depend on the reactions with the environment later But in the fertilized ovum are present, in a definite form, the possible characteristics, some of which are like those of the parent and some are different We shall presently see how these variations arise

The idea that *"like produces like"* has always been familiar to man, and even at the present time must be considered as the main law of heredity Cats give birth to kittens, and human beings to human babies It is not possible for the former to give birth to the latter or *vice versa* Even among the same species it is noticed that offspring resemble their parents in physical and mental traits Intelligent parents have intelligent children, dark parents give birth to dark children, and so on

Weissmann tried to explain this on the basis of his theory of the "continuity of the germ-plasm." Galton

about fifty years ago found that not only did the offspring resemble the parent, but that it resembled in the same way its earliest ancestors even The body grows as a result of the multiplication of cells starting from the fertilized ovum. In this process of multiplication, cells for specialized functions are formed. We are here concerned with only those cells which perform the reproductive function. This part of the germ-plasm, *i.e.*, that which forms the reproductive cells, does not take part in the construction of the body of the offspring but is reserved unchanged It perpetuates itself and forms the germ-cells of the following generation. What happens then is that this part of the germ-plasm is continuous from generation to generation. Weissmann worked out the details of Galton's theory and hence the "germ-plasm theory" is known after him According to it, from what we have been saying above, the parents (the father and the mother) are not the producers of the offspring, but rather the custodians and trustees of the germ-plasm which they pass on to the offspring to carry forward and be in turn the future custodian. The reproductive part of the germ-plasm is passed on from generation to generation as if withdrawn from one bank and deposited into another. We shall presently see that Weissmann's theory does not explain the whole business and is not quite satisfactory either The biological theories explain the position better.

The manifestation of the law of similarity can be seen clearly in the inheritance of the mental traits. both superior and inferior, in certain families whose family

trees have been studied by biologists and statisticians like Galton, Havelock Ellis, Cattell, and Karl Pearson. As an example of inheritance of superior mental traits may be mentioned the Wedgwood-Darwin-Galton[1] family which has in every generation produced men of the highest eminence For five successive generations Fellow-ships of the Royal Society have been scored very prominently by members of this family. Francis Galton has surveyed the situation fully in his book, "Hereditary Genius".

On the negative side may be quoted the notorious 'Jukes' family of New York studied by Dugdale. The family started with a vagabond fisher about two-hundred years ago. The sons of this man married degenerate women from a depraved family and then multiplication proceeded generation after generation in similar vicious circles, with the result that nearly 3,000 social degenerates and mental deficients have been produced whose maintenance costs the State a heavy sum

The 'Kallikak' family studied by Goddard exhibits both features in the progenies started by two separate unions A soldier marrying a feeble-minded and immoral woman gave rise to a tree almost similar to that of the 'Jukes,' and the same man marrying a quakeress of good stock gave rise to tree of normal and decent offspring About 500 descendants from each line multiplying in similar classes have been studied

We referred to the insufficiency of explanation of the Weissmann-Galton theory specially because the

[1] See the family table given in SANDIFORD'S *Educational Psychology*, page 17

biological findings do not quite substantiate it. Although the germ-plasm referred to does not take part in the growth of the body, it is difficult to imagine how far it can remain quite separate from the rest of the individual during his growth Its exact continuity seems a mirage. It may be passed on almost similar to what it is when received, but to assume that it is passed on exactly so is not quite sound. The individual passes on to the offspring a germ-plasm similar to what he receives from the parent but not the same germ-plasm which he received. In fact, some do not accept the theory even so far. MacBride, a biological critic, admits very partially the theory of the locking up of the germ-plasm. He has found that in certain animals, specially the vertebrata, the germ-plasm does not remain isolated after the embryonic stage and gets absorbed into the system And then when the organism develops, reproductive cells which give rise to the offspring are formed. These, however, are similar to the germ-plasm In lower animals the "germ-plasm trustee theory" holds in an unqualified way

VARIATION

What exactly brings about variation and what is also responsible for the continuation-of-the-like tendency in heredity, can best be explained by 'Mendel's theory.' Mendel's theory took firm ground only at the end of the last century although the Czecho-Slovakian monk Mendel brought to light his first investigations as early as 1865. Before discussing this theory of vast

import it is necessary to define what variation exactly stands for from the point of view of evolution. The difference or departure from one generation to another is of a nature that can be transmitted by heredity further. It is not a departure grafted on a certain generation and carried no further Variation has to do with the difference created in the potentiality of the germ-plasm, something that can be expressed from within It is not like an acquired trait which presents a change from one generation to another. Variation again is not lawless It follows more or less the mathematical laws of probability Variations in traits between individual members of any homogeneous unselected group, so far as each trait is concerned, will always tend to arrange themselves on the normal curve of probability[1] An experiment with heights or weights taken from a normal population, or with marks obtained by school children (if it is an unselected group) in any subject, will amply bear this out

Mendel's original experiments were carried on in the garden of his monastery with garden peas The experiments were on hybridization Early in the present century the experiments which were first confined to plants have been extended to animals also Such quick-breeding animals as mice, rats, rabbits, whose several generations could be observed in a portion of the lifetime of man gave suitable material Of late the fruit-fly Drosophila which breeds very quickly and which shows a variety of traits has become the chief

[1] See BROWN AND THOMSON· *Essentials of Mental Measurement*, Chapter II, pages 25—44

subject of experiment In the case of Mendel's peas the problem was rather simple because peas could habitually self-fertilize.

Before explaining the findings of Mendel and enunciating Mendelism, it is necessary to refer to the theories of evolution in the understanding of which Mendelism has thrown a new light. There has been some conflict of opinion as to how exactly evolution has been brought about. According to the theory enunciated by Lamarck the zoologist, it is supposed that the modifications which arise in each individual by its response to and reactions with the environment are inherited in some degree by its offspring. The accumulation of these modifications from generation to generation after some ages produces a new animal [1]

[1] Lamarck's laws and other views quoted from J. ARTHUR THOMSON'S book *The Study of Animal Life*, page 419·

'Nature in all her work proceeds gradually, and could not produce all the animals at once. At first she formed only the simplest and passed from these on to the most complex '

' The operations of Nature in the production of animals show that there is a primary and predominant cause which gives to animal life the power of progressive organization, of gradually complicating and perfecting not only the organism as a whole but each system of organs in particular.

First Law—Life by its inherent power tends continually to increase the volume of every living body, and to extend the dimensions of its parts up to a self-regulated limit.

Second Law—The production of a new organ in an animal body results from the occurrence of some new need which continues to make itself felt, and from a new movement which this need originates and sustains

Third Law—The development of organs and their power of action are constantly determined by the use of these organs

Fourth Law—All that has been acquired, begun or changed in the structure of individuals during the course of their life, is preserved in

This theory was an enunciation of factual data obtained from noting the dwindling of certain organs in animals and the modifications in others, *e g*, increase in the size of the wings of long distance birds, furs on animals of cold countries, changes in the bones of the legs of the horses etc. Now most of the zoologists of the present day believe that modifications which are produced during the lifetime of an organism are acquired characters, and are not transmitted to offspring [1] Discussion is rife, and although in general it is held that

reproduction and transmitted to the new individuals which spring from those which have experienced the changes.

[1] J. ARTHUR THOMSON is rather emphatic about not accepting the possibility of the transference of modified characters.

See *The Study of Animal Life* page 383

"Precise illustrations of the influence of function on animals are far from abundant Three simple cases may be cited (1) A Japanese investigator, Shinkishi Hatai, has shown in the case of the white rat that long continued exercise markedly increases the weight of the heart, kidneys and liver on an average to about 20 per cent He exercised the rats for 90—180 days which is comparable to a period of 7—14 years in man for the span of life in the white rat is three years nearly (2) Semper and De Varigny found that when fresh water snails were reared in vessels of a shape that allowed them abundant water but very little surface on which to take exercise they developed into dwarf forms Every precaution was taken to secure abundant food, perfect aeration and thorough removal of waste products (3) The results of physical exercises show that the size and strength of a muscle may be greatly increased by persistent exercise This is well known in the legs of professional dancers, and in the arms of the blacksmith.

Even if we could gather many illustrations of the influence of use and disuse on individual animals we should still have to find out whether the peculiarities or modifications acquired by individuals were in any representative way transmissible to the offspring or whether any secondary effects of the acquired characters were transmissible or whether these changes had no effect upon succeeding generations

What may be the outcome of further experiments on the use and disuse no one can tell, but as things stand at present there are very few adequately precise data in regard to individual modifications due to pecu-

acquired traits cannot be transmitted, experiments like those of MacDougal on rats[1] escaping from a swimming bath, and Pavlow's rats trained to come for food on hearing a bell, do put one's mind to thinking. MacDougall placed rats in the swimming bath and left two gangways for them to escape. One was lighted and the other dark In passing through the lighted way the rats got an electric shock Through the other they did not Evidently through trial and error they chose the latter. The first generation made 165 errors while the 23rd only 25 The useful habits acquired thus were transmitted J. W. H. Harrison's experiments on moths in *industrial areas—referred to by* Godfrey T. Thomson[2]—claim to bear out Lamarckism. Harrison noticed that moths of a certain species in industrial areas were not of normal colour but were getting blackish (not external paint). He took moths of the same species from another place which did not have the blackishness but were of normal colour He divided these into two groups, one was fed on normal food, but the food given to the other group consisted of metallic salts found in the atmosphere of the industrial area. This was put on the leaves of the food plants of the latter. Eating this did not change the colour of the members of the latter group, but the succeeding generation of these showed some of the melanic type The offspring of the normal coloured control group were not affected at all.

liarities in function, and no quite sure data warranting us in believing that individually acquired functional modifications can be transmitted to the offspring as such or in any representative degree ''

[1] *British Journal of Psychology,* April 1927 and January 1930.

[2] GODFREY H THOMSON· *A Modern Philosophy of Education,* page 131

NATURAL SELECTION

The other theory besides Lamarckism which has tried to explain evolution, and more correctly, is known as 'Darwin's theory of natural selection' According to Darwinism the transformation of species is due to the survival of the fittest and the destruction of certain kinds of individuals in each generation by the play of adverse circumstances of the environment. The eliminated individuals would be killed in some cases before they breed, in other cases the reproductive period will be cut short Consequently the next generation does not inherit the traits of the eliminated lot. Only the features of the survivors are inherited Sorting again takes place and the features of the survivors pass on to the next generation. Natural selection will thus proceed. That is how in cold countries only the furry animals would breed and survive It is Nature that will alter the fur, the muscles, the limbs, etc

The important factors operating in this natural selection would be—(1) Germinal variations of mutations due to inborn tendencies which arise in the germ-plasm. Harrison has tried to prove the possibility of certain environmental factors influencing the gametes and creating new mutations by his experiments on moths just mentioned Some of these mutations help in the struggle for existence (2) The number of possible offspring producible by every couple amongst animals is large In higher animals the number produced tends to be small In lower animals it is considerably higher But the num-

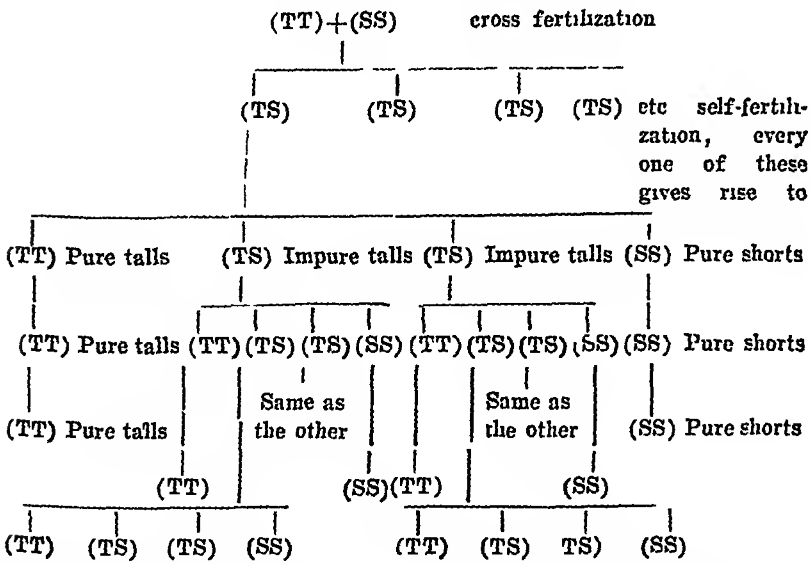
ber in no species seems to increase particularly. It ranges round a constant. In fact, some of the lower species tend to vanish. The destruction is not haphazard. It is based on the principle of survival of those fit to withstand successfully and to utilize the environment. (3) Evolution depends on the mechanism of heredity so far as 'like begets like' is concerned. It is only by this that the advantageous mutations and alterations can be maintained.

Mendelism

The objection raised against evolution is the swamping effect of inter-crossing. Any large variation in a favourable direction would lead to the survival of the individual imbued with this. But this may be weakened in the next generation because the best fitted individual may have to mate with an average member The offspring will be an average, and in a few generations the favourable variation would tend to be lost. To meet this objection Mendelism has come to the helm by discarding the theory that when A and B mate they give rise to $\frac{A+B}{2}$ According to Mendelism the dominant trait as such could be maintained and so also the recessive.

One of Mendel's experiments may be mentioned to explain the mechanism of offspring production. Two types of peas—one tall (TT) and the other short (SS)—are sown and cross-fertilized The resultant peas of the first filial generation are all tall (TS) No short one makes its appearance. Now if these products of

the first filial generation are self-fertilized, i e, if (TS) and (TS) are crossed among themselves, the product of their first generation or the second of the original fertilization does not consist of all talls Talls and shorts are produced in the ratio of 3:1. The shorts of this generation are pure shorts and if self-fertilized give only shorts Generation after generation they go on producing shorts. But the three talls of the second generation exhibit a peculiar combination One lot of these three is pure tall, and like the pure shorts produces generation after generation pure talls. The other two may be called impure talls, because each of these when self-fertilized gives rise to talls and shorts in the same ratio 3 1 as the first hybrids did These in turn give rise to talls and shorts as mentioned before. The following table will explain the occurrence better·—



We have assumed here "tallness" as the dominant trait

and 'shortness' as the recessive. Dominant is that characteristic of the individual which is not weakened by cross-fertilization. That is why we had all talls (TS) in the first generation of our peas. Recessive is that which opposes but recedes in the presence of the dominant. Should the dominant be not present the recessive which lies dormant shows

It is clear from the above account of a Mendelian experiment that Mendelism helps in rendering accurate an important aspect of Darwinism. According to the latter natural selection working on infinitesimal variations and over a long span of time could produce a desired change or mutation, but Mendelism works out this idea of variations upon which selection works in a definite way. Large mutations may be worked out in a short time

Mendel's experiments bring out the conclusion that although physiologically any organism is a unit yet from the standpoint of heredity it is a complex of a large number of heritable units. It must be clearly understood that in our illustration of peas 'tallness' and 'shortness' are units independent of the nature of the plant as a whole. Mendel further explains the above mechanism on the basis of what he calls the "segregation of pure gametes," a hypothesis which has been fully borne out by later cytological studies. According to this, the reproductive cells or gametes of each individual of the hybrid generation contain only one of the two alternative characters Some have the dominant or tall, others the recessive or short, but none is a mixture of the two. And the two types of the in-

dividuals are nearly equal. Now if two germ-cells both containing the factor (dominant) tallness unite to form a fertilized egg or zygote, the resultant is tall. If the two germ-cells uniting both contained the factor (recessive) short the resultant zygote would be having short character. Such zygotes are called 'duplex or homozygote.' If, however, the two germ-cells contained opposites, one the tall character and the other the short, the resultant zygote will definitely show the dominant character tallness. Such zygotes are called 'simplex or heterozygous' The chance of dominant homozygote being produced would be 1 in 4, so also that of recessive homozygote. That of impure dominant, *i.e*, heterozygote would be evidently 2 in 4. Thus, out of 4 we shall have 1 pure tall, 1 pure short, and 2 impure talls (tallness having been assumed dominant).

The sum and substance of the whole thing is that the hybrids when they come to form their own sperms (male) or egg cells (female) produce pure parental types with the dominant characters The offspring of the first generation is free from all influence of cross. Breeders have taken advantage of this knowledge and can produce plants or animals exhibiting one or other of the characters. The principle has been employed in cattle-breeding and crop-producing. In man, too, the eye colour, the hair colour and its thickness, lip thickness, colour blindness and a number of other characters have been found to follow the principle of Mendelism But the experimental conditions needing control are very vast in the case of man In the case of plants and animals the conditions to be controlled

are very few, with the result that the desired types could be produced by a process of controlled breeding.

The factors tallness, shortness, blue-eyedness, etc., referred to above, which are contained in each gamete or germ-cell, are called 'genes.' These are borne upon certain thread-like bodies within the gamete. These thread-like bodies are called 'chromosomes.' Now the number of chromosomes in lower animals say the Drosophila is 4, whereas in the case of each human sperm or ovum they are said to be 24. Each sperm combining with an ovum can give rise to a million combinations or more And then each chromosome bears a certain number of genes or factors. Consequently variations in human beings are so widely distributed.

It is difficult to approach anything that may be called identical heredity in order to settle some of the questions on the relative importance of heredity and environment. With lower creatures and plants one could have a better approach to the investigation. In man, however, the study of twins which is the nearest approach in identical heredities has been made by Galton, Thorndike, etc. Twins alike in sex, unlike in sex, those having a common placenta or a common chorion, siblings, cousins, unrelated children, orphans, have all been subjected to comparative study with the help of intelligence and other tests "The amount of resemblance in general intelligence varies from r=0 for unrelated individuals to a maximum or r=·90 for physically identical twins. Intermediate values are found in accordance with the genetic relationship of the individuals. Therefore, there is an increasing degree of

resemblance in general intelligence among human beings with an increasing degree of blood relationship among them. *Ergo,* general intelligence is an inherited trait."[1] We shall return to a discussion of this point in a later chapter when considering the nature of intelligence. Of course there is no denying of the fact that intelligence as mental capacity is native and inborn.

HEREDITY *vs.* ENVIRONMENT

This at once brings us to the point from where we started. We can never hope to make 'a silk purse out of a sow's ear,' and the scope of education is limited. It is impossible for the teachers to produce a race of geniuses with the best devised means. But if heredity and environment are regarded as correlative factors, the former providing the potentialities and the latter facilities so that the potentialities are fully realized, then it will be clear that education has an important

[1] SANDFORD: *Educational Psychology* pages 47—49.

"Coefficients of correlation for intelligence among groups exhibiting different degrees of genetic relationship. (The first four and last are from Wingfield's study, the others from researches of other workers)"

Group	r
Physically identical twins ..	0 90
Like-sex twins	0 82
Fraternal twins	0 70
Unlike-sex twins	0 59
Siblings .	0 50
Parent-child ..	0 30
Cousins ..	0 27
Grandparent, Grandchild ..	0 15
Unrelated children .	0 00
Orphans .	0 00

part to play. Education will see that potentialities, to whatever extent are present, are not wasted so as not to make the poet lament that "full many a gem of purest ray serene" is lost to the world. With whatever potentiality, if a child from a highly intelligent and civilized family is taken at birth and flung into a barbaric home, it will be an amazing experiment to see what changes the lack of education works out into the life of the individual child. The child transferred from the cultured home to the barbaric shall have retained his biological heredity *with* which he was born, but would have lost all his social heredity *into* which he was born in the cultured home.

Our social heritage consists of all that is bodily, incidentally, and determinedly passed on to us by the generations gone before. All our great architectural monuments whether they be Elephanta Caves, or the Taj, or the Kutub Minar are vestiges of social heritage passed on to us bodily. Our customs, manners, social etiquettes, mother-tongue, system of philosophy, scientific and other knowledge, etc , go to make up the social heritage we are born into The young child grows in the environment where these manifest. In order to become a member of the society he incidentally assimilates some, and others he is made to learn formally. The parent providing at home a good library suited to the interests of the child, a suitable set of mechanical toys and other instruments, a collection of good pictures and paintings, an atmosphere of peace, good behaviour and family affection, etc , tries to make the child live in the best conditions that social heritage offers him. A

school where the teachers use improved text books, where methods of teaching are based on all the past experiences gained in this direction, where organizations of the best type that man has evolved exist, undoubtedly brings about the growth of the child in the best phases of the social heritage left by the previous generations

What education does is to influence the lives of the individuals in a certain generation When they produce their offspring surely none of the culture is passed on in the germ-plasm The offspring retains only the biological heredity of the parents and not their culture But each generation receives a social heritage which is the sum-total of the past achievements. This it utilizes and renders richer for the coming generation. And, education is the agency through which this is made possible It is education only that makes it possible for us to imagine a progressive and prosperous world where 'the absolute welfare of all men together' is assured generation after generation.

Thorndike in his 'Educational Psychology' has some illuminating passages wherein he expresses "We may even expect education will be doubly effective once society recognizes the advantages given to some and denied to others by heredity . . To the real work of man for man—the increase of achievement through the improvement of environment—the influence of heredity offers no barrier But to the popular demands from education and social reforms it does . In the actual race of life, which is not so much to get ahead as to get ahead of somebody, the chief determining

factor is heredity .... But the prizes which education ought to seek are all within its power .... For the common good it is indifferent who is at the top, which men are achieving most. The important thing for the common good, for all men, is that the top should be high, that much should be achieved. To the absolute welfare of all men together education is the great contributor."

References for further reading

1 ROSS: *Groundwork of Educational Psychology*, Chapter V
2 SANDIFORD: *Educational Psychology*, Chapter I
3 THORNDIKE: *Educational Psychology*, Vols I and III
4 NUNN: *Education Its Data and First Principles* Chapter IX.
5 KENNEDY FRASER · *Psychology of Education*, Chapter I
6 G. H THOMSON *A Modern Philosophy of Education* Chapters VII and VIII.
7 TWENTY-SEVENTH YEAR BOOK · *National Society for the Study of Education*, Public School Publishing Co., Illinois, Parts I and II
8 BAGLEY: *Determinism in Education*
9 J. A. THOMSON. *The Study of Animal Life*.

CHAPTER IV

INSTINCTIVE BEHAVIOUR

No matter in psychology so much vexed the psychologists during the earlier part of this century as the theory of instincts. The discussions, however, have thrown considerable light on the nature of instincts possessed by man, and how they operate The possibilities of employing these vital forces present in the human mind, and of directing them from primitive modes of reaction to such as are beneficial to society, have been well explored As a result of this work, considerable progress has been made in industrial, educational, and other social fields because, in each of these, modifications of human behaviour are sought. The task of the teacher which seemed limited, owing to his inability to alter the intellectual capacities possessed by the educands, has been considerably increased in scope by a clear comprehension of the driving power behind these tendencies Life, both for the gifted as well as for those whose capacities are limited, can be made fully worth living because emphasis has been laid on the fact that an individual's tendencies are educationally and socially very important Drever has very hopefully put the situation by stating that "in school,

and in life no less, it is the driving power that counts in the long run."[1]

Every individual's mind has a native equipment of emotional tendencies and intellectual capacities, so often popularly defined as the qualities of the heart and the head, respectively. His whole future personality or character is built up on this initial equipment. His native tendencies undergo a process of modification and organization in the environment in which he is brought up. The more wholesome the adjustment and organization of these tendencies the better is the individual produced. It is the business of education to ensure for the child a wholesome surrounding in which these tendencies will find their proper expression, their balanced adjustment, and satisfactory organization. In order that the educator may be successful in his task, a knowledge both of the nature of native equipment as well as of the possibilities of its expression, modification, and organization is essential to him

We have just mentioned that every individual is born into this world with a native equipment consisting of innate tendencies and intellectual capacities. We shall treat the problem of native intellectual capacity in a later chapter We shall here concern ourselves with these innate tendencies so often called 'instincts.' The word 'instinct' has been quite loosely used in popular language. The instinctive modes of reaction

[1] DREVER: *An Introduction to the Psychology of Education*, page 44

have been attributed only to animals, and man has been considered above that low mode of conduct. Instinctive behaviour has also been regarded as synonymous with simple mechanical 'reflex action,' or at best, as Herbert Spencer imagined, as a 'compound reflex'. It seems necessary to understand clearly the nature of the 'reflex act' and bring out clearly how an 'instinctive act," appearing as it does in so many of its phases a 'reflex act,' differs from it.

'Reflex act' and 'Instinctive Act'

A reflex act is a very simple mode of reaction of an organism to the stimulus received from the environment. When a stimulus is received by any sensory-organ, and there is a prompt[1] motor response to it, we say that a reflex act has been carried out. Any number of examples or reflex acts may be given, varying from the type where a very simple nervous arc is formed to those where the arcs are most complicated The following may be regarded as typical reflexes—the closing of the eye-lid when there is anything threatening the eye; the contraction of the pupil when there is bright light; the jerking of the hand when it touches something very hot or very cold; the withdrawal of the hand on receiving an electric shock accidentally, the withdrawal of the

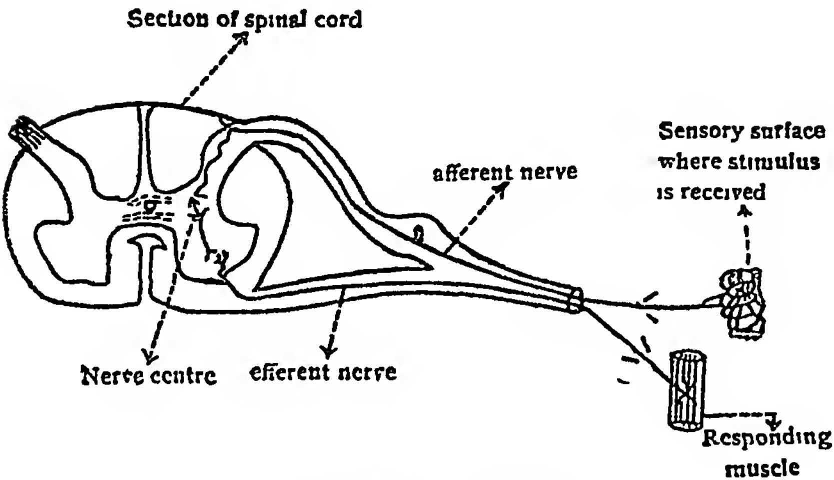
[1] The response in a reflex act is very quick Woodworth's *Psychology*, page 24, gives the following times for some of the simple reflexes· *"The eye-lid reflex is quicker than the quickest simple reaction taking about* 05 second The patellar reflex is quicker still taking about 03 second"

foot when the sole of the foot is tickled; the flowing of water from the eye when a dust particle gets in; the free flow of saliva when a palatable food is presented or visible to a hungry animal. There are also reflex movements taking place internally in the body, *e.g.* movements inside the stomach or intestines; the widening and narrowing of arteries resulting in flushing and paling of the skin.

The reflexes mentioned above are inborn and can be carried out by the organism without any training for them. There are some reflexes which are acquired subsequently, particularly by man. There are many mechanical things that we learn to perform reflexly, *e.g.*, in cycling, dancing, knitting, etc. A man can go on cycling, and a woman can go on knitting without the least element of thought just like an automatic machine. It is the feel of the seat on the saddle and of the feet on the pedal that carries along the man on the cycle, while it is the fingers' feel of the needles that lets the woman carry on the knitting automatically. Should an obstruction come in, the reflexive nature of the act ceases and it becomes an act of thought and adjustment. All the automatic things which we learn to do mechanically are called acquired reflexes.

Physiologically a reflex act consists of the reception of the stimulus through the concerned sense-organ, and its passage up the afferent nerve to the proper nerve centre; and then the return of the message, representing the response, down the afferent nerve to the muscle which exhibits the response by some movement as

ordered by the nervous centre For the lower type of reflex act this nervous arc is a simple one



Scheme of a Simple Reflex Arc

The nerve centres on the spinal cord control the business. The stimulated nerve current passes the message to the spinal cord centre which gives the order to the motor neurone, without the message having to be carried up to the centres situated on the brain.

It can easily be seen that the reflex movements, although very simple and automatic, are definitely

meant for the organism's welfare. The closing of the eye, the jerking of the hand, the withdrawal of the foot, and the movements within our digestive and excretory systems, etc, all tend to protect us and keep us alive. The physiological apparatus for a reflex movement (not acquired reflexes) is quite perfect right at birth. The necessary neural connexions are quite ready to carry on their function

Instinctive acts, as we popularly understand them, are liable to be confused with reflex acts Instincts are native tendencies which are responsible for a more or less fixed type of behaviour in a fixed type of situation. That being so, from the point of view of a mechanistic biologist, an instinctive act would be of the same kind as a reflex one with perhaps only a difference in degree depending on the complexity of the nervous arc operating in the process. Herbert Spencer called an instinct nothing but a compound reflex To him a reflex act was the lowest form of a psychical act and the most nearly related to a physical one It was the sole form of life observed in the lowest species, but as regards the higher organisms it constituted the lowest type of mental process. The next higher form was 'instinct' which consisted of compound reflex actions in which diffused simultaneous changes were transformed into concentrated serial changes. According to him, in higher forms of instinct there was probably a rudimentary consciousness. A modern mechanistic biologist like Loeb will accept no more. He puts instincts clearly in the same class or genus as the reflex acts and

tropisms.[1] Loeb definitely proposes to maintain that an instinct is a system of chained reflexes. Watson, in defining an instinct as a "combination of congenital responses unfolding serially under appropriate stimulation" expresses his agreement with Loeb in so far as a "schematic outline" of the instinct is concerned, because in attempting to analyze an instinct in the lowest terms the only simple and clear way to understand its composite nature is "to look upon each such element of activity in the pattern as a whole, as a reflex."[2]

As differentiated from the purely mechanical reflex activity the higher organisms are capable of performing highly conscious acts involving a play of volition and what not. The method of response in conscious acts is acquired and cannot be called instinctive. Physiologically the highest conscious acts are controlled by centres situated on the association areas of the

[1] Tropisms are the responses of certain low animals to such stimuli as light, heat and cold, etc. Loeb in his 'Forced Movements, Tropisms and Animal Conduct' states "If a moth be struck by light on one side, those muscles which turn the head towards the light become more active than those of the opposite side, and correspondingly the head of the animal is turned towards the source of light. As soon as the head of the animal has this orientation and the median plane (or plane of symmetry) comes into the direction of the rays of light, the symmetrical points of the surface of the body are struck by the rays of light at the same angle. The intensity of light is the same on both sides and there is no reason why the animal should turn to the right or left than away from the direction of the rays of light. Thus it is led to the source of light. Hence 'instinct' that drives the animal into the light is nothing more than the chemical—and indirectly the mechanical—effect of light, an effect similar to that which forces the stem of the plant at the window to bend towards the source of light."

[2] WATSON. *Psychology from the Standpoint of a Behaviourist*, pages 233-34.

cerebral cortex. Now, if the instinctive act is not of such a high order as to be placed at the level of the conscious act, and not of such a low one as to be classified as a mechanical reflex, it must be classified somewhere between the two types, according to the degree of consciousness attributed to it.

Some physiologists like Herrick and Sherrington have tried to take this midway view and defined the position in physiological terms. If the conscious volitional act can be attributed to the cortical centres, then the instinctive act must be controlled by centres which are located in the sub-cortical regions They claim justification of their view on the basis of the results obtained from experiments done with animals, whose spinal cords and sub-cortical parts of the nervous system have been retained, but whose cerebral hemisphere have been removed. Woodburne[1] quotes an experiment from Herrick which points to a certain extent in this direction: "Herrick records the case of an infant who lived to the age of three, and who was so inert that absolutely everything had to be done for it It showed no signs of hunger, though it swallowed food when placed in the mouth. After the infant died an autopsy was performed, and it was ascertained that everything was normal save for the absence of cerebral hemispheres and cortex." According to Sherrington also, the response to certain stimuli of children whose cerebral hemispheres and mid-brain are absent is of the same type as that of the normal ones.

[1] WOODBURNE: *Human Nature and Education*, page 21

We should not be wrong in attributing an element of consciousness to the instinctive act—an element which is not present in the reflex activity.

The problem as treated in the paragraphs above has been examined more or less from the physiological point of view And so long as in psychology an undue emphasis was placed on the physiological side of the operation of 'instinct' and on the mechanical nature of the instinctive behaviour, till then the true nature of instincts was not arrived at The difficulty, as Drever points out, was that psychologists were "accustomed to oppose animal behaviour to human behaviour, regarding the one as typically instinctive, the other as typically intelligent, and also to maintain that the instincts and instinctive tendencies of human nature are insignificant Had the psychologist been clear as regards the psychological nature of Instinct, this position could not have developed "[1] We shall, therefore, proceed to examine the instincts from the psychological point of view. That will serve a useful purpose from the point of view of education as well.

Psychological Nature of Instincts

To McDougall goes the credit for bringing into the limelight the true nature of these innate mental dispositions from the psychological point of view in his publication, 'An Introduction to Social Psychology' 1908 Subsequent discussions on the subject by Drever, Thorndike, Shand, etc , have clarified and amplified

[1] DREVER · *Instinct in Man*, page 151

the psychological aspects of instincts, and brought to bear views from different angles of vision The relationship of instinct and emotion, and the classification of human instincts have both been matters of contention But the discussions have in no way minimized the importance of these innate dispositions in building up the mental structure of the human adult. Some of them on the other hand have, in fact, facilitated the use of instincts to social purposes more and more In this chapter we shall follow the views of such thinkers as have led to a clearer comprehension of the subject, adjusting the ideas in a manner best suited to our purpose

We have said that a human being is essentially a purposive being as differentiated from a highly efficient and complicated automaton, although he posses-ses sufficient fixity of habit and regularity of conduct. His behaviour is not physical but psycho-physical. He possesses a system of forces which gives a vital power to what he does. His thoughts and actions are motivated by mental structures called dispositions Some of these dispositions are inborn, and excite fixed responses to fixed stimuli when the latter are perceived Others are acquired dispositions which are developed in the course of life, on the basis of the innate dispositions possessed by him.

It may be mentioned here that the purposive character of action just mentioned is exhibited in the actions of men as well as of the other animals. It is the distinguishing characteristic between the response of animate beings and inanimate objects. In fact, it is the essential mark of life. In psychology, which

is distinctly a biological science, since the behaviour exhibited is purposive, it is necessary at the outset to be clear as regards the nature of the life process, and the essential mark of a living being

We have said in a previous chapter that a living organism is essentially a system of vital forces, and is self-determining in its reactions Drever emphasizes that the living organism is not a mass of material substances organized on the basis of physical and chemical laws A living cell, or a group of cells is not merely a complex mixture, or a compound of various substances. There is something over and above this structure,—that which is not found in dead protoplasm It is the vital activity of the organism The living organism is thus a centre of a system of purposive activities. Now this system of forces, which is capable of operating, is responsible for the behaviour of the organism. It determines its reactions. The stimuli which the organism receives from the environment give it the occasion to respond. It is the inner drive or purpose possessed by the organism, which is the cause and determines the response. The theory of mechanical activity cannot hold for organisms in general. At any rate, it does not hold at all in the case of man and higher animals whose behaviour can be analyzed and clearly interpreted in psychical terms.

The actions of cats, dogs and monkeys in opening latches, in assuming positions suited to their purpose for

obtaining food are distinctly indicative of insight.[1] We can easily explain a train of activity that we may note in a monkey or a dog trying to obtain food when hungry, in terms of our own experience. The actions of the animals differ from automatons in several respects. In a machine the behaviour is fixed in all its details for a certain cause. But in the case of an animal, say a dog, for the same cause or drive,—"to obtain food when hungry"—the behaviour will vary on different occasions. Then a machine, although it begins to run smoothly, never improves by practice so as to eliminate the unnecessary movements in the same response But all learning experiments with animals indicate that with practice the number of unnecessary movements is decreased. The number of wrong movements made by a rat in getting out of a maze to obtain food is diminished considerably by responding again and again.

The nature of the 'purpose' or the 'inner drive' of living organisms needs to be analyzed a little more from the psychological point of view. The activity of all living organisms is purposive in so far as it is

[1] KOHLER in his book, '*Mentality of Apes*,' has tried to demolish the theory that the actions of monkeys and apes, and other animals can be explained on the mechanical basis, or even in terms of habits. Their behaviour can be interpreted by attributing to them some degree of insight. They understand the situation and then react Quite a number of experiments are given in support of this explanation. In one of the experiments bananas were placed in a basket and the basket hung so as to be out of the reach of the monkey. The basket was given a swing. At one end of the swing was kept a beam The monkey watched the swing just once, and was then up on the beam to get the banana The monkeys of Kohler have reacted successfully in many more difficult situations, thus indicating presence of 'insight'

striving to reach a certain goal, willed and prescribed by the Creator of the organism. Now, do not the machines made by man also attempt to reach a certain goal? There is a certain final product willed and prescribed by man,—the creator of the machine,—to produce which the machine works. Physiologists like Loeb[1] would advocate a mechanistic conception of life after the Descartian view which regarded man as a highly complex machine, and say that the purposive natures of the machine and the living organism are essentially the same. But we cannot help stating it emphatically that the purposive natures of the two differ in one very important respect While the goal in case of the machine remains fixed, the organism in the process of its growth evolves, creates, and makes definite its goals at various steps. The living organism undergoes a process of progressive growth, and exhibits a capability of creating its necessary future after making a choice between the possible reactions. It is self-determining and able to make definite as to what the teleological basis is exactly going to be It is owing to this that it becomes difficult to interpret the reactions of a living being, however lowly placed, just in terms of physico-chemical laws.

[1] NUNN. *Education Its Data and First Principles,* page 15 Loeb's "experiments on artificial fertilization, on the artificially directed growth of animals and on the 'tropistic' factors in the instinct, are undoubtedly most impressive. They gave him the hope—perhaps we must call it a pious hope—that a physico chemical explanation will be found in time for all the 'wishes, hopes, efforts, and struggles...... disappointments and sufferings' that form 'the contents of life from the cradle to the bier' "

Advocates of the 'hormic theory,' in order to differentiate the 'purpose' of the living organism from that of 'matter,' use the word 'Horme' to indicate the inner urge of the animals (low or high) which forms the basis of their activities, and indicates that they are self-determining and independent in their reactions with the environment Nunn,[1] while upholding the psychological as against the mechanistic view, asks "Are we, since our bodies are 'matter,' to seek in physical laws an explanation for the whole of life; or are we, since our bodies are alive, to interpret their activity by what we know of life where its character appears in the highest and clearest form,—namely, in the conscious life of the mind?" "The animal's life is, of course, permeated (as human physiology is) by chemical and physical factors; but just as a poem, though permeated by grammar, is more than a sum of grammatical expressions, so the behaviour, even of a protozoan, escapes beyond the conception of a physico-chemical machine. In short, the humblest creature is autonomous." "Stupendous as the distance is between the lives of the protozoan and the creature who has been made a little lower than the angels, it consists—like the difference between a village church and a cathedral—not in any radical unlikeness of the essential features, but rather in the differing richness, variety and subtlety of the details in which a single scheme has been worked out at different evolutionary levels"

The self-determiningness of the living organism, although independent and not bound by mechanical

[1] NUNN: *Education. Its Data and First Principles*, Chapter II

laws as in the case of a physical machine, is not after all altogether lawless as may be imagined. The purpose behind the self-determiningness is directed to the two biological aims of life—preservation of self and propagation of species—interpreted in their widest sense We shall, however, not include all man's activities, more specially those where altruistic aims predominate, in the primitive biologcal goals But most of human activities up to a certain stage, can safely be included in the wider sweep of the biological ends The drive that impels the organism in attempting to fulfil these objects is served by certain tendencies which are innate in the organism. These inborn or inherited mental dispositions, impelling the organism to behave in ways directed to fulfil the biological aims of life, are called 'instincts.'

McDougall defines an instinct as "an inherited or innate psycho-physical disposition which determines its possessor to perceive, and to pay attention to, objects of a certain class, to experience an emotional excitement of a particular quality upon perceiving such an object, and to act in regard to it in a particular manner, or at least, to experience an impulse to such action"[1] We shall centre our discussion round this definition so as to bring out the nature of the instincts and their relation to emotions

Examples of instinctive reaction can be obtained from the behaviour of the lower as well as higher animals Moths and butterflies always lay their eggs in those places where young caterpillars will be able to

[1] McDougall *An Introduction to Social Psychology*, page 25

find the food they require The mother receives sense-impressions from the suitable places and behaves in that particular way. To press the psychological standpoint, even in this simple case, the cause of its behaviour which is fixed both as regards the stimulus and the response, is the inner drive,—the necessity of laying eggs. The odour of the leaf, the feel of the plant, occasion the behaviour. The dog is the great enemy of the cat, and the kitten while quite young, on just perceiving a dog crouches and assumes a feline attitude Although untrained and untaught, the kitten cannot help behaving in that way. The little baby on seeing a furry animal (sometimes even an artificial toy made so, proves quite sufficient for the reaction) withdraws the hand, is frightened, and even runs away if it can.

According to McDougall the instinctive behaviour exhibits all three modes of mental experience. The triple division of mental experience consists of cognition, affect, and conation, so often called knowing, feeling, and striving. We might illustrate these by taking a simple example. Mr. A is standing in a library in front of a shelf crowded over with books His eyes fall on certain works of H. G. Wells. Mr. A is a teacher, he knows of H. G. Wells as an educational thinker, and desires to read some of his works. Finding now an opportunity he goes to the librarian, asks him to take out one of the books, brings it home and reads it during his available time. The process of knowing or recognizing the book is cognition, the pleasure felt in the mind at the prospect of having a book by H G. Wells to read, is the feeling or affect, the getting the

book issued and reading it is the striving or conation to fulfil the desire till it is completely realized In the above case we have all the three modes clearly marked and succeeding one another in the order—cognition, affect, and conation It is not possible to see the three modes clearly marked in every one of our mental experiences. They so often coalesce, and it is a very critical analysis that can discriminate them It may be possible that in a certain experience only one mode of experience, say the feeling, or the conation, that is marked But a careful analysis will show that while one element is prominent the others are existing though not in a very pronounced degree

To return to instinctive behaviour, in it are present all the three aspects—cognition, affect, and conation It is, of course, a psycho-physical process. Let us keep in mind the example of the child running away on seeing a black cat The child at the moment may be receiving any number of sense-impressions, but there is only one set of impressions (that from the black cat), or, in other words, the perception of the cat, that becomes the occasion for the instinctive action In the initiation of the instinctive behaviour this particular perception plays the dominant part because it has a meaning to the child. Psychologically speaking, the child has the instinct-interest. Physiologically, his nervous system is peculiarly fitted to receive that impression and respond to it After this perception has taken place, McDougall holds that "the creature exhibits unmistakable symptoms of feeling and emotional excitement"[1]

[1] McDougall *An Introduction to Social Psychology*, page 24

In this case the child is frightened. He exhibits an emotion of fear. He may show both mental and physical symptoms under the influence of the emotion. This is the affective aspect. Whether the emotion is always present or not, we shall discuss later in considering the question of instinct and emotion. Lastly, the child crouches or runs away, or does something to escape from the animal. In other words, he shows an attempt to strive and complete the necessary response to meet the situation This is the conative aspect. The natural activity has to proceed in a specific direction and the organism strives to see that the goal is reached.

We have been using the word 'instinct,' and the expression 'instinctive behaviour' freely; and the significance of each should be clear in the mind of the reader. 'Instinct' signifies something different from 'instinctive behaviour.' Behaviour is an action or a process which is a passing event, while 'instinct' is a lasting, existing mental disposition which is responsible for the behaviour 'Instinct' is a mental structure, while 'instinctive behaviour' is a function. 'Instinct' as mental structure is the lasting thing As we shall see later, there are the hereditary mental structures like instincts. and there are the acquired mental stuctures like sentiments which influence human behaviour.

We shall now proceed to examine the characteristics of 'instincts.' They are tendencies innately possessed by us Instinctive modes of behaviour are native, and do not include those modes of reaction which we get as a result of training and education, however automatic the latter be. It is quite a different matter that

most of our later tendencies are formed on the basis of these native ones, and become their substitutes in later life. But at the start the tendencies are innate and operate in a pretty primitive way when proper stimuli arise.

Amongst every species the tendencies are common to all the members Quite a lot of 'instincts' (hunger, sex, flight, etc.) are common between men and animals. The difference, however, lies in their operation. In man, except in the earlier stages, no instincts operate in a pure form, nor are any directed to the primitive biological ends in their narrow sense, as in the case of the animals. This has often led writers of old to attribute instinctive behaviour as the mode of reaction pertaining to animals and derogatory to the "lord of creation." Again, although these tendencies are common to all members of the species, it must be noted that there is a great deal of difference between individuals so far as the relative strengths of operation of these are concerned This difference depends on various factors. Sex makes a difference The instinct of pugnacity operates more strongly in the male than in the female The parental instinct accompanied by tender emotion operates more strongly in the mother than in the father Again, not all the tendencies operate with the same strength at all ages, nor do they make their appearance all at once in the beginning The sex instinct, for instance, begins to ripen at the commencement of the adolescent stage (Freudian view excepted), and operates strongly during and after puberty The physical condition of the brain also effects the operation of instincts. In the normal human being the instincts

operate with certain social restraints, whereas in the case of those who have dementia or other diseases, these bonds are let loose and the individual begins to exhibit most primitive and unsocial types of conduct.

The instinctive behaviour is in the interests of the organism. The mental structures or dispositions given innately are as it were to safeguard and ensure the welfare of the organism. Without them the organism would be engulfed and swamped by the environment. All such instinctive acts of low animals as the migration of birds, hibernation of frogs, mating, withdrawing from the enemy, are in the interests of self-preservation or preservation of the species. According to Lloyd Morgan, the criterion of instinctive behaviour is that "it is practically serviceable on the occasion of its first performance."[1] Besides the biological phase of the serviceableness, which we have mentioned above, Lloyd Morgan emphasizes the psychological phase as well Instinctive acts really speaking help the organism in the same way as the intelligent acts do. According to him "an instinctive behaviour is a joint product of instinct and intelligence in which the co-operating factors are inseparable, but none-the-less genetically distinguishable."

As the reactions of the living being with the environment multiply his experiences increase, and then his reactions are determined not merely by the primitive innate dispositions but by their modified forms owing to the acquired experiences. Nature has given to the mind, particularly of man and to a certain extent of

[1] LLOYD MORGAN: *Instinct and Experience*, page 22

some of the higher animals as well, what may be called the power of conserving experiences. If this were not so, the mind would not profit at all by experiences and man's conduct would never be able to rise above the primitive purposive level As it is, experiences are conserved. This power of conservation has been called "Mneme"[1] Since man's mind possesses the power of conservation, it is clear that besides the very first occasion when he acts on instinctive impulse, his subsequent actions in that particular direction can never be called purely instinctive This is educationally important, as we shall presently see, for it points to us the possibility of grafting a suitable experience on the innate disposition so that the conduct may be rendered socially valuable.

INSTINCT AND EMOTION

McDougall, in defining an instinct, emphasizes the fact that the organism experiences "an emotional excitement of a particular quality" after the cognition of the object which starts the instinctive impulse to action. In the list of instincts given by him he has attempted to define a pronounced emotion which accompanies each one of them.[2] In some of the instincts

[1] NUNN. *Education: Its Data and First Principles*, page 23.

[2] MCDOUGALL: *An Introduction to Social Psychology*, Chapter III.

The instinct of flight and the emotion of fear
The instinct of repulsion and the emotion of disgust
The instinct of pugnacity and the emotion of anger.
The instinct of curiosity and the emotion of wonder
The parental instinct and tender emotion
The instincts of self-abasement and self-assertion and the emotions of subjection and elation, etc

the emotional phase is very well marked, while in the others it is not so prominent. In general he holds the view that emotion, which is the affective aspect of the instinctive process, accompanies every instinctive act in some measure or the other. What the exact position should be it is difficult to say, as there is considerable difference of opinion between psychologists as regards the exact relationship of emotion to instinct.

Whatever the relationship be, one thing which is important from the educational point of view is clear, and that is the force imparted to an act of behaviour by the appearance of an emotion on the scene. In instinctive behaviour the impelling tendency gains all the dynamic power owing to the emotion. It is emotion that opens the stop-cock and lets go the mental energy which carries the conative phase of the behaviour to its maximum limit. It is needless to emphasize the utility of this motive power. Since the driving power counts in the long run, the human mind devoid of emotion would be incapable of achieving anything that its potentialities warrant. Since the emotion lets go the mental energy the possibilities of a crude, primitive, and undesirable type of behaviour being exhibited and pursued is as much, and perhaps more, as that of a desirable behaviour being strongly persisted in. The organization of emotions, so that they may give the necessary mental energy to a conduct which is socially permissible and desirable, would be the important task of education. We shall treat this question more fully in considering the formation of sentiments. We shall first discuss the nature of emotion, and the way in

which it makes its appearance during the course of an instinctive behaviour, particularly in the human being

Emotion has been defined narrowly as well as very widely. It has been interpreted both in relation to its psychological as well as physiological mode of expression Ordinarily everyone understands what is meant by being disgusted, afraid, angry, elated, etc. There is hardly anyone who has not noticed such modes of experience in his own consciousness A crude analysis is sufficient to tell us that there is a feeling element predominantly present in all such modes of mental experience To find a complete and exact definition of emotion from any psychologist is not easy, as each one in doing so has "generally defined it in such a way as to lead on to, or support, a particular theory of the emotions"[1] One emphasizes the feeling element, another the physical disturbance, a third the dynamic force, and so on. According to Drever[2] five prominent characteristics which make a mental experience an emotion can be recognized. We proceed to consider these

(*a*) An affective relationship to an object or idea is present In anger, for instance, there is some object of anger which is perceptually present, or there is an idea which is the cause of the anger and which exists in the focus of consciousness The angry person always tries to fight the object or idea, whichever it be, as if a war was raging against it

(*b*) 'Organic resonance' is predominant During anger the face is flushed, eyes are red-shot, the indi-

[1] DREVER *Instinct in Man*, page 158

[2] *Ibid*, pages 158-59

vidual trembles, and so on. Not only this, physiologists have been able to show that there are internal bodily reactions which go on during emotion. During anger or fear adrenalin is secreted by adrenal glands. This adrenalin on mixing with the blood tends to coagulate it. The experiments of Canon have shown that in a condition of emotional excitement the coagulability of the blood increases. Physiologically the amount of sugar in the blood is increased, and this gives a lot of muscular and physical energy for the time being. During emotional excitement the digestive system also slows down. "The general result so far obtained is that emotional disturbances of a negative polarity (that is, disagreeable) involve disturbance of digestive function in all its aspects. The flow of saliva is diminished or altogether inhibited, and its chemical composition altered; the flow of gastric juices is similarly diminished or inhibited, and altered chemically; and the digestive movements tend to cease."[1]

Again, physiologists have been able to locate the centre of emotional activity on the thalamus. The centres not being on the cortex, conscious conduct for the time being is suspended. The centres in the thalamus control the undefined, unlocalized sensibility which has been called 'protopathic' by Henry Head. When the sensibility is well defined and can be precisely located and discriminated, it is said to be of the 'epicritic' order. This evidently is controlled by the cortical centres. The feeling under emotional influence is of

[1] COLLINS and DREVER: *Experimental Psychology*, page 195.

the protopathic order and not of the epicritic one, and hence there is no control of the higher centres. Emotional reaction consequently is violent and often quite out of proportion to the exciting stimulus

James in his famous Jame-Lange theory advocates the 'organic resonance' as the essential characteristic of an emotional experience. Physiologically such a position (especially as can be seen from the evidences given above) is satisfactory, but psychologically it does not give us a complete account of the emotional experience James would have us hold that emotion is nothing but a feeling of a bodily state, and it has a pure and simple bodily cause. He says: "My theory is that the bodily changes follow directly the perception of the exciting fact, and that our feeling of the same changes as they occur is the emotion. Common sense says, we lose our fortune, are sorry and weep, we meet a bear, are frightened and run, we are insulted by a rival, are angry and strike .... This sequence is incorrect. The bodily manifestations must first be interposed between, and the rational statement is we feel sorry because we cry, angry because we strike, afraid because we tremble .... Without the bodily states following on the perception, the latter would be purely cognitive in form, pale, colourless, and destitute of emotional warmth [1]

[1] JAMES *Psychology Briefer Course*, pages 375—76

James advocated the importance of bodily states before the physiological discoveries mentioned in the preceding paragraphs were made. In a way his theory by these later researches is substantiated, but just in so far that an account of bodily sates included in the emotional experience is all right. No psychologist would deny that the bodily states and physiological changes accompany an emotion, but it would be ultra behaviourism to assume that the emotion is nothing but these bodily states and their apprehension by the mind. "The feeling tone and the experienced impulse are equally essential"[1] In any emotional experience there must be present the feeling tone as experienced mentally. The bodily changes are a correlate of it in the physical system. Anger as a mental feeling is present before or while the angry man strikes in anger, the individual does not feel the anger because he finds himself striking.

(*c*) In every emotional experience there is some sort of pleasure-pain feeling which lurks behind and colours the experience. The more vigorous the emotion is the more strongly is the experience coloured by the pleasure-pain feeling. It has been noticed that during anger and fear there is generally a feeling of pain that accompanies at the start. Then if the conation phase proceeds successfully the pleasure feeling mildly makes its appearance.

[1] Ross: *Groundwork of Educational Psychology*, page 66

(*d*) Every emotional reaction tends to be violent, and hence has a good deal of impulsive force behind it. The violence of the reaction tends to make the organism plunge headlong, quite uncontrolled by higher purposes. We said the emotional reaction on the physiological side corresponded to the protopathic order. The influence of higher centres ceasing to operate, the result is that higher purposes and principles are entirely overwhelmed and suspended.

(*e*) An important characteristic of the emotional experience is that the feeling attitude during emotion as it were limits the choice of behaviour, and the individual prefers only to do acts of certain kinds and no others It would be wrong to imagine that the mind chooses out of many alternatives just a few towards which it would like to proceed That would mean our assuming that the higher mental processes are freely carried on What actually happens is that "the consciousness is narrowed down and also specialized," thus limiting the choice of actions which could appeal at the moment Really speaking the instinct-interest limits the choice and the affect makes it narrower still.

We may now briefly touch the McDougall-Drever controversy. To discuss their views with all the implications would not only be not possible in a limited space, but perhaps would not be quite necessary for our purposes here. According to McDougall any definition of instincts which omits the element of emotional

experience would be incomplete. He insists on our accepting that in an instinctive behaviour the organism in presence of the stimulating object or situation "experiences an emotional excitement of a particular quality." What he evidently holds is that there are varying degrees of emotional excitement, but in some measure or the other the emotional excitement does acompany an instinctive act. We have mentioned before some of the specific emotions which he has attached to some of the specific instincts.

Drever holds the opinion that the emotion, as emotion, is not essential to the working of an instinct. The essential thing to work it is the 'instinct-interest' or the 'worth-whileness' which the organism feels for the specific behaviour. For an instinctive act to attain its completion, it is not necessary that an emotional excitement should make its appearance. The emotional excitement makes its appearance only when the instinct mechanism is not allowed to proceed smoothly towards its goal. The moment it is baulked and impeded in its progress the emotion comes in. The greater the baulking and the stronger the obstacle to smooth working the more vigorous is the emotional excitement. Even in such an instinct as that of 'escape,' where the emotion 'fear' so often (almost in cent per cent cases) characterizes the behaviour, the presence of 'fear' is not essential If the organism can calmly escape there is not the correlative fear present at all.

But, of course, the moment there is the slightest obstacle in hiding or in running away, as is almost always the case in this response, fear makes its appearance

Ordinarily as Rivers has pointed out, in a danger situation the manipulative activity is greatest and the affective state is missing. The organism responds most wonderfully—by running extraordinarily fast, or by jumping very long distances. While this sort of manipulative activity is possible no emotion makes its appearance The moment there is obstruction in it there is emotional excitement. Drever argues that during manipulative activity the cortical centres operate alright When they cease to operate there is emotion at once. Rivers has said that while during manipulative activity affect or emotion is missing, there is "peraps a certain degree of excitement" One might safely argue and say, it is then after all a difference of degree in excitement. Excitement of a higher degree becomes emotion Drever, however, holds "that the emotion is not an integral part of, or at least the central and permanent element in, the instinct. When the instinct mechanism does not work smoothly, an emotional perturbation makes its appearance"[1] He differentiates between an emotional perturbation and a non-emotional excitement as differing in kind.

Without going further into this discussion we may find something at least very useful from the

[1] DREVER: *An Introduction to the Psychology of Education*, page 56.

educational point of view in this "baulking theory" of Drever. An emotion excitement makes its appearance whenever and wherever there is any impediment in the mechanism of any tendency, whether it be native or acquired. A child in his behaviour, whether it be in class-room work or outside work, finds himself so often thwarted. Then, an emotional excitement is bound to appear in the mode of experiencing the situation, which may upset his response. A well-organized system of emotions may give him a most desirable type of impulsive force to complete his response in a proper channel. A disorganized emotional excitement might simply throw him off the rails entirely in his behaviour. In reading aloud, in conversation, in delivering speeches the emotional excitement coming in,—directly proportional to the square of the impediment experienced, —often precipitates the individual's behaviour. The teacher has consequently to be on guard and minimize the recurrence of awkward situations. The emotional perturbation arises with extreme facility, and baulking is more conspicuous by its presence than otherwise in responses controlled by innate as well as acquired tendencies in general.

Classification of Instincts

The question as to how many primary instincts may be recognized has been another matter of contention between psychologists. One basis of classifi-

cation is biological and proposes to divide the instincts on the basis of the two biological ends of life—preservation of self and production of species. In a small degree in some of the higher animals, but in a larger measure in man, besides these two a social end has also to be recognized, because group life is the necessity of human life The three classes of instincts, therefore, according to this basis, are those concerned with self, sex, and herd interests. Thorndike divides the tendencies into two main groups, individual and social.[1] His list is a very large one and includes forms of behaviour which would be classified as reflexes, instincts, inborn capacities, and even complex forms of behaviour Drever has classified the instincts on a psychological basis He recognizes the two main groups, "appetitive" and "reactive"[2] The appetitive tendencies are those which are "evoked by experiences which are agreeable or disagreeable, and in which the end sought has reference merely to this agreeableness or disagreeableness" The reactive tendencies are the instincts proper and are "characterized by the fact that they are evoked as reactions to specific objects or situations which are apprehended, and the end sought are with reference to those objects or situations."

[1] The list in THORNDIKE'S *Educational Psychology*, Volume I, is a very large one That in the "*Briefer Course*" has some of the following —

(*a*) Individual—original attentiveness, gross bodily control, food-getting, protective responses, anger, etc

(*b*) Social—motherly behaviour, responses to the presence, approval, and scorn of men: mastering and submissive behaviour, imitation, etc

[2] DREVER *Instinct in Man*, page 169.

McDougall divides the tendencies into two classes[1]—

DREVER'S CLASSIFICATION

Innate tendencies

- Appetitive tendencies
  - General (Seeking of pleasure and avoidance of pain)
  - Specific (Hunger Thirst Sleep Sex Nausea)
- Reactive (Instinct) tendencies
  - General (Play Experimentation Imitation Sympathy Suggestibility)
  - Specific
    - 'Pure' (Probably numerous though difficult to distinguish from reflexes and may perhaps be classified as:—
      Reactions of adjustment and attention
      Reactions of prehension
      Reaction of Locomotion
      Reaction of Vocalization)
    - 'Emotional' (Anger Hunting Acquisitive Curiosity Gregarious Courtship Self-display Self-abasement Parental)

[1] McDOUGALL's list of Instincts from *Social Psychology and Outline of Psychology*:—

(a) *Sepecific* *Name of Instinct*		*Corresponding emotion.*	(b) Non-specific.
Flight	..	Fear	Suggestion
Repulsion	.	Disgust	Sympathy
Curiosity	.	Wonder	Imitation
Pugnacity	..	Anger	Play
Self-abasement	.	Subjection	
Self-assertion		Elation	
Parental instinct	..	Tender emotion	
Acquisition	..	Feeling of ownership	
Construction	..	Feeling of creativeness	
Gregariousness	..	Feeling of loneliness	
Reproduction	.	Lust	

(1) the specific tendencies or instincts, (2) the general or non-specific tendencies. These latter arise out of the complexity of the human mind reached as a result of evolution.

EDUCATIONAL UTILITY OF INSTINCT

We are now in a position to discuss the general usefulness of instincts and general innate tendencies in the process of education It is only in recent times that their importance has been sufficiently recognized with the result that they have begun to be regarded as the bricks with which the whole structure of the human character is built The way they are manipulated, adjusted, organized, and allowed to play their part, will determine the sort of character which the individual will acquire

The behaviour of the lower animals is almost always determined by instincts, pure and simple, and is very little modified by any experience They act more or less in definite and invariable ways as prescribed by instincts In man there is hardly a behaviour that remains so simple as to be on the instinctive level Man's behaviour right from the very early stages begins to be modified by the element of experience, and goes on becoming more and more complex as he develops and reacts in his environment. Immense complications of the instinctive behaviour, in view of what he learns, are brought about till ultimately the primitive tendencies appear entirely to be obscured. In any behaviour it is not the native pur-

pose or interest that is the drive to action but acquired interests give the impulse. Again, it is not one tendency only that operates but several of them combine together to produce the resultant action. The tendencies are gradually modified to suit the growing needs. They are organized into systems which give the necessary impulse to the desired type of actions. It is the business of education to take advantage of these primitive impulses to action, modify them, and organize them into systems as would lie at the base of conduct socially approved and accepted. The instincts serve as the base on which education builds the mental structure of the individual.

How the instincts are to be modified depends on the nature of each one of them because the specific stimuli which set them off are different in each case. The procedure of grafting new and desirable modes of reaction on the native ones has to be different in different cases, and no general rules can be laid down. We shall treat here some general characteristics of the instinctive response which can be of particular help to the teacher. 'Fear' is stimulated not only by certain specific objects or situations, but in man it is stimulated by the very idea of these. What is true of fear is true of others as well. In general the instinctive reactions can be initiated not merely by the perception of the specific objects or situations but by their mere apprehension in he mind. In order to evoke any response from the child in connection with any of the instincts it is not necessary to make him perceive the specific stimulus but merely to give him a mental

apprehension of the same The idea of punishment is enough to frighten the child and stop undesirable conduct. (Frightening the child is not, however, to be taken as a desirable method in pedagogy.) With proper training this can be rendered sublimer when it is not the idea of punishment but the idea of self-respect that becomes the motive power for the child's reactions We shall consider this more fully later

One of the matters in connection with instincts which is important from the educational point of view is what is called the 'law of transitoriness' of instincts. James enunciates it thus: "Many instincts ripen at a certain age and then fade away."[1] It appears a sweeping generalization and its universal validity has been questioned But in a restricted way there is no doubt that it is true, and as such it has a far reaching application in methods of teaching and training There is no doubt about the fact that although all the instincts characteristic of a certain species are present as inherited mental dispositions in every individual at birth, they do not start to operate right when the individual starts his life These innate mental dispositions or instincts are given to an individual by heredity, to help him in fulfilling his life-needs and also to give him joy in living, and so they begin to operate when the organism feels the proper need

The baby needs suckling since birth and so the instinctive reaction starts at that early age. Again, curiosity, constructiveness, etc, that have to do with

[1] JAMES *Psychology Briefer Course*, page 402

learning about the environment with the help of sensory experience, make their appearance as soon as the child is capable of manipulative activity. Sex (except in the Freudian sense) makes its appearance during puberty when the needs of the manhood or womanhood demand that sort of reaction. Instincts if they are to be of service must begin to express themselves with proper force only at their due time.

Much emphasis, however, cannot be laid on the transitory aspect of the instincts While we do find that every instinct has a span of full bloom when it operates and expresses itself rather strongly, to assume that it dies out altogether or ceases to operate would not be accurate. Despite inhibition and sublimation there is a tendency particularly in man to regress to modes of conduct not justified by age or maturity. Ordinarily, if an innate tendency while it is at its period of activity is not given sufficient opportunity of practice it tends to be dulled as it were Like the rusted knife it is unable to operate in time of need. If, for instance, when the suckling tendency is present the baby is not allowed to do so and is fed differently, he finds it very difficult to react later in the proper way. The writer knew of a baby whose mother died very early and the baby afterwards was spoon-fed by other relations. Its early reactions with the spoon were an attempt at suckling; then it learnt the new procedure. When the baby was a year-and-a-half old owing to the death of the father, a wet nurse was engaged. The little baby found considerable difficulty in adapting back to suckling though it relearnt its

inborn mode of reaction. It would, however, be wrong to assume from above that the instinct was entirely extinct The law of transitoriness is not absolute One can say that just as it is easy to hammer iron when it is hot, so the proper time to exercise an instinct is when it is expressing itself with full vigour It is comparatively more difficult to put it into operation after the normal time of its activity is gone

The important thing for the educator is to know exactly when each instinct ripens, and to utilize the impulse behind it when the time is most suitable. All acquired behaviour is obtained by modifying and adjusting the native modes of behaviour. The hereditary bricks of conduct must be utilized in building the structure of character before these bricks get buried under soil and silt. As James said, "it is the duty of every educator to detect the moment of instinctive readiness" for any particular subject or mode of behaviour and "to seize the wave of the pupils' interest in each successive subject before its ebb has come so that a knowledge may be got and a habit of skill acquired." If the suitable period is passed the process not only becomes difficult but it sometimes impossible because the native allies have not been rallied round in their period of full force and strength

The instincts and tendencies impel an individual to adopt modes of conduct specific to them. These modes of conduct or reactions are not in all cases approved in their native and naked form by any civilized human society. An attempt is therefore made by the educator to prevent such modes of conduct from appear-

ing. The blunt way of dealing with them, when they are not desirable, is to repress them, thus preventing them from making appearance every time they tend to do so. These tendencies are characteristics of human nature, and at the stages of life suited to them they are bound to make their appearance. If they are repressed they tend to lie in the subterranean regions of the human mind, and gradually organize themselves into highly undesirable systems which burst like an abscess. We shall discuss this matter later when we treat the question of mental conflict and complex formation which has to be prevented if a well balanced character is to be formed. Instead of repressing the tendencies they should be sublimated.

Sublimation is a process by which "the energies of our instinctive nature are utilized on higher planes of action than the instinctive."[1] The instinctive process discharges some mental energy and directs the action into channels approved only by the primitive nature of man. In sublimation this energy is utilized in directing the activity into channels approved and permitted by cultured society. The process of sublimation was advocated first by Freudians in connection with utilizing the impulse behind the all-powerful sex instinct and directing it into nobler channels. It is recognized now as of universal application by all psychologists, but its *modus operandi* still remains obscure.

In the practical politics of educational work the application of sublimation is clear and simple. It

[1] McDOUGALL: *An Introduction to Social Psychology*, page 441

consists merely in getting the purchase on the child when the instinct makes its appearance in the native form, and right then and there to provide an environment in which actions of a desirable type only are possible The child finds the necessary field for activity and slowly and unconsciously drifts into the channel aimed at by the teacher The child is curious, he is fond of construction, and he is desirous of combat. It is for the educator, when these tendencies appear in the child, to see that proper opportunities are provided in the child's surroundings, that these tendencies instead of being prevented from operating are allowed full play, but only in such directions as would prove profitable for the building up of the right sort of man. It is the sublimation of curiosity and construction that in time to come produces the scientist and the inventor. It is combat or pugnacity sublimated through games and proper studies that produces an individual who is a real clean fighter, and a self-respecting, self-asserting free citizen.

We have just spoken of the right sort of man. Who is he? One who knows 'how to live' is what Spencer would tell us. Plato would have us believe him to be one 'who has been trained well to feel pleasure and pain at the right things' Thorndike would think him to be one who has 'the good will to men,' and who lives 'a useful and happy life' contributing to the 'noble enjoyment of all.' What he is to be, is not exactly within the scope of discussion here, but how he can be produced on the basis of the native modes of reaction is within the scope of psychology to suggest If only the educator realizes that the instincts are factors to

be reckoned with, that they are the impulses to action which can be made the allies for transforming lower types of actions into higher ones, that they should not be repressed but suhblimated, then he should have no difficulty in building up a character in his educands—a character which is so much the praise of the poet, the politician, and the philosopher.

For further reading

1 DREVER. *An Introduction to the Psychology of Education,* Chapter IV
2 DREVER · *Instinct in Man*
3 McDOUGALL. *An Introduction to Social Psychology,* Chapter II
4 JAMES: *Principles of Psychology,* Chapters XXIV & XXV.
5 LLOYD MORGAN *Instinct and Experience*
6 NUNN: *Education, Its Data and First Principles,* Chapter XI
7 STUART AND OAKDEN *Modern Psychology and Education,* Chapters I & II.
8 THORNDIKE: *Educational Psychology,* Vol. I.

CHAPTER V

SOME INSTINCTS AND GENERAL TENDENCIES

Education aims at the modification of the behaviour of the educands. Each instinct represents the source of a certain phase of the individual's behaviour. Any scheme, therefore, which proposes to study behaviour with a view to modifying it, should take into account every possible instinct. Ideally speaking, the educator should study every one of these springs to human action in order that he may be able to utilize them to his advantage Such a task would be a stupendous one. It becomes, therefore, necessary to select certain instincts and tendencies whose value in the scheme of education is particularly important, and study them with a view to finding out how far they can be employed in the teaching and training of the child It has, of course, to be borne in mind that the instincts, although they may be so many separate mental dispositions, all go to constitute the one unit mind. The essential unity of mind must first be accepted. The different mental structures cannot be regarded as separate wholes like the old faculties. They are all connected with one another. Hence sometimes several instincts operate together, or when one is operating the others appear on the scene to complete the response. We propose to treat in this

chapter the following instincts and general tendencies—curiosity, constructiveness, sympathy, suggestion, imitation and play. The last is not regarded as a tendency in the same strict sense as the others are, by some psychologists. They hold that various instincts and tendencies like combativeness, curiosity, imitation, etc., are so often realized in the play-way It may thus be regarded as a tendency evolved to serve the other tendencies.

Curiosity

Curiosity may be defined as the tendency towards further cognition of an object or an idea It is instinctive in man and to a certain extent in such higher animals as the monkey to try to get to know more about any object that is presented to consciousness. Often, in the case of a child a struggle may be noted between repulsion and curiosity when confronted with a new object. Curiosity, however simple it be, necessitates an approach to the object which is being cognized. Curiosity is highly characteristic of childhood, but it never seems to die out in later periods of life. The change that is brought about by age in the play of this tendency is as regards the field from which the objects are selected for cognition. So far as the child is concerned every new impression assails his mind. Bright, colourful objects, sounds produced anywhere, attract him at once. He approaches moving objects—little living animals in preference to static dead things. He is drawn towards actions and accounts of actions, and not so much towards ideas and discussions about them. A simple

stretch of imagination will make it clear that all things that interest the child have a meaning to him. An adult has acquired interests, and consequently his interests differ from those of the child. The child is startled by any random object or event, the adult is attracted only by situations and things which are relevant to his acquired interests. One is most curious to know about things concerning one's profession. When profession ceases to have interest, then wider questions—questions relating to philosophy of life, etc., —begin to have meaning And the philosopher is thus curious about abstract ideas in the same way as a child is about a new toy or a small animal

Whether it be the child or the adult, one having gained possession of the object of one's interest one starts probing and dissecting the object with a view towards further cognition and knowledge. This further cognition depends largely on the mind content The baby's curiosity is idle. It is attracted by the new object just as the monkey is It manipulates it, receives various sense-impressions from it, and as soon as its curiosity is satisfied it leaves the object It cannot hold on long to one thing, and although everything that it handles is with a view to further cognition, it too frequently changes the object of its cognition As the mind content gets richer with experience, as with a little boy at school, this manipulaion of the new object lasts longer. There is much more of cognition of a new object in the case of a schoolboy than in the case of babies. Curiosity is idle when just because of this instinct there is random attraction towards an

object. As no specific aim is to be achieved this attraction does not last long. When the attraction is above the instinctive purpose and lasts till the aim of the injury is satisfied, we have meaningful curiosity.

Curiosity has an important place in school work. It depends on interest, and if the teacher knows the interests of the children of a certain age, he can place such suitable objects in the way of the children as may attract them. Mere attraction, however, will not do. The teacher must introduce the element of meaningful curiosity, and lead the children through the means that he has at his disposal to the solution of vital problems. The children must have the attitude of discoverers and must persist till the discovery is made. According to McDougall, "the attitude of curiosity is essentially one of suspended judgment; and that is the beginning of wisdom, of questioning, of further examination, and of explicit judgment."[1] It is clear from this that curiosity offers in the hands of the teacher a very suitable instrument for creating the spirit of scientific investigation and for inculcating in the minds of the children a desire to know more of what is worth knowing. With this ally he can lay the foundations for producing scientists who will ardently pursue the problems of nature, and philosophers who will think critically and grapple with the problems of existence. How far the teacher is to cater for the interests of children, what kind of objects he is to introduce, will depend on the age of the children and the purpose to be achieved. One thing,

[1] McDougall: *An Outline of Psychology*, page 144.

however, must be clear: that in trying always to excite the curiosity of the children he must not fall into the temptation of what is called 'soft pedagogies.' In making the path of cognition and gaining knowledge smoother for children then element of effort must never be eliminated. We shall discuss this matter again in dealing with the question of 'interest.'

Constructiveness

Constructiveness, speaking generally, is the tendency of purposive manipulation of the environment to produce something new. The spider's construction of the web, the bird's building of the nest, and the insect's making of burrows and holes, all display this instinct marvellously in the acts of the lowly animals. The manipulation of the environment for building something always brings about a change in the existing arrangement of things. Constructiveness, which is characteristic of low animals, is characteristic of man as well, but in a more highly evolved degree. It need not, however, be imagined that the instinct is possessed by species lower than man and higher than insects or birds in a proportionate degree. Except for one or two kinds of apes in the East Indies, the constructive tendency is hopelessly wanting in the monkey. Children are by nature delighted in making and breaking little things,—mud houses, sand forts, etc.—and hence the evidence of the presence of this instinct in man is clear.

Construction, so far as a child is concerned, must

not be understood in the same sense exactly as that in which an adult understands it. From the point of view of a child, construction and destruction are the same in so far as they bring about a change in the existing arrangements of the environment. Construction is a creative tendency. And although it starts in the earlier period of life which mere random handling of objects and putting them together and pulling them apart, if it is properly directed it may lead the individual to be a great architect or an engineer. The earlier attempts at construction, since they necessitate the handling of objects on the part of the child, help him to explore and thereby understand his environment. The qualities and properties of things and objects are grasped by the child according as to what he does with them. The child puts the solid cylinder in the cylindrical bucket and makes a bigger solid cylinder. but at the same time learns about the relation between the heights and diameters of the two. Everything that the child is made to do in his educational handwork class helps towards a proper expression of this tendency.

The earlier constructions of the child are more or less imitations of what he sees round about him—it may be the building of an arch with suitable blocks in the kindergarten stage; it may be the building of a crane with a Meccano set in the early boyhood—but as the boy advances, as his imagination develops, it is not purely on the imitation level that he works. He then designs, and uses his constructive imagination to building something that may be new; at any rate, he

shows hmself capable of re-assembling in a new form the elements of something that he has already seen. And it is within possibility that one day he may develop into an individual who designs and constructs something quite original in the walk of life chosen by him.

General Tendencies

Apart from the well-defined 'instincts' but not definitely differing from them in genus are certain general tendencies like imitation, play, etc., which are of great educational value. These tendencies have an important social reference and go a great way in influencing the general social development of the child. Both the 'instincts' as well as the 'general tendencies' are inborn and have all the common characteristics of being innate mental dispositions, and hence must be regarded as mental structures. One of the differences pointed out between 'instincts' and 'general tendencies' is that while the former are aroused and operate in specific ways, the arousal and operation in the case of the latter is general. Another difference that can be noticed is that in the case of instincts the emotional factor is more or less a well-defined characteristic, but in the case of the tendencies it hardly makes itself pronounced But, of course, as Drever says, "the distinction does not seem an absolute one,"[1] because even in the case of such specific instincts as curiosity, constructiveness, acquisition, etc., the emotional tone

[1] Drever *Instinct in Man* page 219

is not pronounced in the normal operation of the instinct . The difference between the instincts and the general tendencies ultimately resolves itself into a difference of degree and not of kind.

Sympathy

By some this is regarded as an instinct, but it is generally classified as a general tendency. McDougall classes sympathy with suggestion and imitation and calls them 'pseudo-instincts.' James, led by the popular usage of his time, called 'sympathy' an emotion. In whatever terms sympathy may be interpreted one thing about it is clear. It presumes some sort of social interaction. For the operation of this tendency there must be at least two individuals. There must be some one who transmits and another who receives. Drever defines sympathy as "the tendency to experience the feelings and emotions of others immediately on perceiving the nature expressive signs of these feelings or emotions."[1] A trembles and cries with fear; B perceives the 'cry' and the 'tremble' and on the mere perception of these B experiences the emotion of fear in himself. 'Fear,' through the tendency of sympathy, very easily spreads in flocks of various gregarious animals like sheep, goats, cows, etc. There is the well-known tale of a whole village beginning to weep because a little girl started the cry, the mother followed her, and was

[1] DREVER: *An Introduction to the Psychology of Education*, page 83.

herself followed by the neighbour and so on, the emotion apparently spreading by induction If the tendency of sympathy were not there such a phenomenon could not occur.

In sympathy it is not necessary that the emotion of another individual may be intellectually apprehended before being felt in the self When one is influenced through sympathy by another one does not necessarily understand the feeling of another, but merely takes on the other's feeling intuitively and begins to experience the same in oneself. Every emotion has some characteristic expressive signs as 'cry' or 'tear' for fear, 'roar' or 'closed fists' for anger, etc, which the individual exhibits when under its influence Now, it is said that in all members of the same species are provided certain ready perceptual inlets (may be the afferent nerves) which specifically receive the impressions from these expressive signs, and make them at once experience the emotion. There may be several sounds produced all impinging on the auditory apparatus, but the impressions produced by 'cry,' or 'laughter,' or 'roar' are not only readily received but also induce the corresponding emotions. The system as it were is tuned to certain notes and resounds at once.

The type of sympathy which we have been discussing McDougall calls 'passive sympathy,' definitely meaning the tendency to experience the feelings of others in ourselves Distinguished from this we have the other type which is called 'active sympathy' Active sympathy is the tendency of actively seeking the sympathetic reaction of others to our feelings and

emotions. Beggars who try to obtain alms by exhibiting signs of all sorts of emotions practise active sympathy. It should, however, be clear that if passive sympathy were not operative, no expression of emotions would evoke similar emotions in others. The beggars who seek the sympathy of the rich, the orators who attempt to play on the emotions of their hearers the teachers who wish to inspire children in the class room, all depend on the tendency of primitive passive sympathy for their success. Their appeals would pass unheeded without this ally.

Apparently the tendency of sympathy seems to be a weakness in human nature It appears to be an agency through which the human being can be misled into experiencing any and every emotion whether of the desirable or the undesirable type. A speaker in a crowd easily plays on the emotions of the mob. He may be a hypocrite but if he weeps he makes others do so. He expresses anger and infuriates the mob, he is elated and he instils joy into the crowd. Mobs have often been led to do all sorts of unreasonable things when the speaker has won the sympathies of his listeners.

But while the tendency seems so harmful, it cannot be denied that it is one of the most powerful agents which play a part in the emotional development of the child. Sympathy cements and binds together animal groups as well as human societies. So far as lower animals are concerned it makes up for intelligence and gives them some sort of social life. So far as human societies are concerned it helps to make the actions of the members harmonious. But for sympathy a child

will not be able to understand how he stands among his fellowmen. It is because of sympathy that he begins to understand himself as related to others and is gradually assimilated into his social group The wailing of his companions evokes wailing, the smile of his fellow-mates evokes in him a smile, and soon he becomes one with them.

Now, so far as the child's emotional development is concerned the teacher's part in bringing it about is most responsible He has to see that he does not take advantage of the child's plasticity, but, on the other hand, utilizes it towards the child's suitable development. The teacher being in an advantageous position can evoke a smile, a wail, or any other emotion as he pleases in the child. The teacher who knows when to smile and when not to, who understands how to wail rightly and smile rightly can evoke the child to do so to his benefit. A teacher who approves of the wrong action or shows wrath at the right one brings about the emotional development of the child on entirely wrong lines.

In lessons in history and literature the attitudes adopted by the teacher, the emotions exhibited by him, and the general outlook taken by him in connection with the various incidents, characters, and human actions are all very important The least mistake made by him will do incalculable harm, and interfere with the building up of the proper sentiments in his children While what he does as a teacher of certain subjects is important, the traits of personality exhibited by him in general are no less so. A humorous, smiling teacher

who is generally optimistic always inspires his class, while a grim-faced frowning teacher only damps the enthusiasm of the children. But while adopting any attitude the teacher has to bear in mind that he express what he feels, he means what he says. Pretensions have never the effect of realities, and a teacher who pretends certain attitudes before the boys never influences them so much as the one who in his inner nature is what he expresses himself to be.

Suggestion

While analyzing a simple memory process we often make the statement, 'The idea A suggests to the mind the idea B.' Here, by suggestion we signify what really should be called the reproduction of the idea. It is necessary to be clear at the outset that, in modern psychology, suggestion is not used in this popular sense of the word. Suggestion, in psychology, stands for an unconscious communication of ideas from one individual to another. The psychological nature of suggestion has been investigated of late, but still there are certain aspects of the question obscured by clouds of doubt and contention. In suggestion, one mind seems unwittingly to act upon another as in hypnotism, and hence the study of this state has led to a certain degree of understanding of the nature of suggestion.

McDougall defines suggestion as "a process of communication resulting in the acceptance with conviction of the communicated proposition in the absence

of logically adequate grounds for its acceptance."[1] Suggestibility is thus our innate tendency to this sort of unwitting acceptance of ideas from others. The tendency is possessed by all human beings but individuals differ in the extent to which they are suggestible. The measure of an individual's suggestibility is the extent to which he accepts ideas communicated by another. The communication of ideas is done mostly through language, although it can be done by gesture and other modes of expression as well. Suggestion may come from within oneself. An idea which is present before an individual, may grip him to such an extent that he may be led to believe it to be true (without any logical analysis, of course). When the source of the idea suggested is one's own self then we call it auto-suggestion. A simple experiment[2] may be performed to illustrate this.—

With a piece of chalk draw two interesting lines at right angles to one another, on the floor, in front of yourself. Make a simple pendulum by tying a nail to a long piece of thread. Hang the pendulum vertically so that the nail points to the intersection of the two lines, keeping the nail a little above the floor. Now attend to the horizontal line and try to pass your attention from one end to the other. You will very soon feel the nail swinging left to right and *vice versa*. If you now concentrate on the vertical line and pass your attention up and down, the swing of the pendulum would seem to be going accordingly. The

[1] McDougall: *An Introduction to Social Psychology*, page 83.
[2] Collins and Drever· *Experimental Psychology*, page 178

pendulum all the while remains steady at the intersection point. (In passing the attention up and down or from left to right the head should not be moved.)

The extent of one's suggestibility is found out by either of the two well-known experiments—(1) Seashore's warmth-illusion experiment, or (2) the Aussage experiment. In the warmth-illusion experiment the subject on whom the experiment is being performed is given in his hand a coil of wire through which an electric current can be made to pass The subject knows that when the current passes his hand should feel warm, and when it does not there should be no feeling of warmth. The actual switch is kept away from the sight of the subject. The current is switched off and on, and the subject is asked to respond by saying 'now' when he feels the warmth. It is found that so often when the current is not switched on (a show only being made by lighting lamps in the circuit) a change in temperature is reported by the subject, and *vice versa*.

The Aussage experiment is the most interesting of all those performed in connection with suggestion, and is mostly tried with school children. In this experiment the children are shown a big wall picture—the Moghal Court scene, etc., will do—for a certain amount of time, generally 30 seconds or so. They are told beforehand that they have to see the picture carefully as questions on the picture will have to be answered. The picture is turned over and a number of questions are put to the children. The questions

which are asked contain all types and vary as regards the extents of suggestibility. Some questions are such which refer to things which are really in the picture, in others there is an alternative choice between two things, one which is in the picture and the other which is not, and some others refer to things not present in the picture Questions may be of some such type — (Court scene)—(1) What is this a picture of?—Durbar; (2) Are there men in the picture?—Yes (correct) (3) Is the emperor sitting or standing?—Sitting or standing (one of these only being correct); (4) Have the courtiers guns in their hands?—Yes (none have guns; the children having been suggested, answer yes); (5) Is not the Vazier kneeling down?—He is (the Vazier is really sitting, but the children having received a strong suggestion answer incorrectly). A number of questions may be asked and the coefficient of suggestibility for each child may be calculated

$$\text{Coefficient of suggestibility} = \frac{\text{Number of suggestions accepted}}{\text{Number of suggestions given}}$$

(The above is expressed as a percentage)

The extent of suggestibility depends on a certain number of factors and conditions. (1) *Age*—It is easy to see that children are more suggestible than adults, for the simple reason that they are less critical owing to immaturity and insufficient knowledge. It cannot, however, be denied that some children are not only more critical than others but sometimes even more critical than some of the less gifted adults. (2) *Knowledge and settled convictions*—Age being the same, individuals who possess knowledge and the power

to apply it, also persons who have definite convictions on certain matters, cannot easily be made to accept something communicated to them without sufficient scrutiny. They are less suggestible than others who are insufficiently mentally equipped or are unsettled in their views about things. (3) *Brain conditions*—An individual whose brain is sound and healthy is less open to suggestion than one whose brain is in a diseased condition. It has also been found that the same individual is more suggestible when he is fatigued than when he is fresh and alert. (4) *The nature of the source of suggestion*—If the idea or proposition which is being communicated for unwitting acceptance comes from a source whose superiority is recognized suggestion is easy. An idea suggested by elders or teachers or highly recognized individuals is accepted much more easily than when the same is communicated by equals or inferiors.

As is clear from the above, a child accepts ideas given by parents and teachers, firstly because he happens to be insufficiently critical, and secondly because the ideas are communicated by individuals much superior to himself. This kind of suggestion in which the subject is led to accept ideas on the basis of the superiority of the source of ideas is called 'prestige suggestion.' The teacher in the class, the parent at home, the leader in a group, the speaker in an assembly, all take advantage of this in communicating their ideas and views to the pupils, youngers, and junior members respectively. The self-abasing tendency of the child who is in the inferior

position is responsible for facilitating prestige suggestion. The teacher helped by suggeston can with ease and facility instil into the minds of his pupils ideas and truths worth knowing and assimilating. But any undue advantage taken of the inferior position of the child, and transmitting ideas constantly through suggestion stifles the mental development of the child. Independent thinking, and development of the individuality of the educand in general, must be aimed at in every scheme of education, and no teacher who carries suggestion too far can be regarded as adopting any procedure justified by sound principles of pedagogy.

The individual, apart from accepting ideas by prestige suggestion, is so often overwhelmed when faced by numbers. In a crowd, or even in an organized group, when the majority round about an individual seem to be holding a certain view, the individual is most unconsciously overpowered and takes on the view of the majority of men about him. Suggestion when it depends on the mere force of numbers is called 'mass suggestion.' In school, in the class-room, on the playgrounds, in unions and gatherings, mass suggestion is often operating, and the child uncritically accepts a certain view of things because all about him seem to hold it. While this is useful in its own way, in so far that a new child is very easily assimilated into the social *milieu* of the school and grasps the traditions of the place, it is liable to have an injurious effect on the individual if the group policies and traditions are not on a satisfactory basis. It is the duty of

the teachers and the senior boys to see that the group traditions are wholesome, so that when the newcomers are engulfed then it is to their advantage and not otherwise.

It has been found that sometimes when an idea or a proposition is communicated through suggestion the subject instead of accepting it, not only summarily rejects it but is definitely inclined to do the opposite This phenomenon is called 'contra-suggestion.' If a child is asked not to move from his seat at a certain time or not to look in a particular direction, he makes it a point to move from his seat or look in the prohibited direction. If the child is not asked not to move it is highly unlikely that he would do so. The fact that he receives a suggestion not to do something leads him to do it. Contra-suggestion is not seen only among children but among adults as well. It has sometimes been found that, if a friend on a hot sultry afternoon in July is told that the weather is extremely stuffy and bad, he is sometimes not only not inclined to agree but to argue that it is not at all bad on that particular day. The negation that is given to a communicated view owing to one's definite stubbornness is of a different nature. There is in that case a volitional attempt (misdirected though) not to accept the proposition. In the case of contra-suggestion the opposition tends to be unwitting and as it were intuitively offered.

The principle of giving children negative orders in schools—don't do this, don't do that—is often deprecated on the ground of contra-suggestion. A certain

evil or fault which is unknown and not in the child's consciousness is deliberately introduced there through this negative form of instruction. 'Write decently' is better than 'don't write badly', as 'spell this word correctly so' is better than 'don't write incorrectly like this' particularly for the younger children. With older boys if an error has been repeated before them, then it is possible to inhibit it by the presentation of the right. With younger children the error presented first makes a very strong impression The better procedure, however, at all stages is to teach through the reiteration of right rather than through the inhibition of wrong, whether the matter has reference to teaching or moral training

IMITATION

With certain notable exceptions, almost every writer on psychology, ancient or modern, has regarded 'imitation' as an innate tendency. The force of imitation in the social development of the individual, and the great part that this tendency plays in making each individual what he is, have both been widely acknowledged It is by virtue of imitation that an individual acquires most of his habits, manners, modes of speech, and various other things. James clearly regarded imitation as a very powerful agency in the progress of the human race when he said, that "imitation and invention are the two legs on which the human race has historically walked."[1]

[1] JAMES· *Talks to Teachers*, page 49.

Imitation may be defined as an innate tendency possessed by members of gregarious species, owing to which an individual attempts to copy in himself the actions and movements that he finds in others. He sees a bodily movement and tries to copy it, he hears a sound and tries to produce the same with his vocal organs, he notices a certain behaviour in another and tries to reproduce it himself. All this is based on the tendency to imitate. Thorndike denies the view that there is a tendency like imitation. The various actions of a child which are explained on the basis of the instinct of imitation, Thorndike would explain on the basis of learning from experience, or in other words, as being due to the operation of the law of habits. Modern thinkers like Drever and McDougall are of opinion that a general tendency of imitation as distinguished from specific instincts cannot be denied. Drever would have no objection to Thorndike's contending the fact that so far as the ends, to the determining of which this tendency operates, are concerned, they are ends already determined on the basis of some other instincts. Such is the character, really speaking, of all general tendencies.

The general tendencies are not directed to ends specific to themselves like the specific instincts. The ends are determined by other specific instincts, and these tendencies operate as aids to the fulfilment of ends already determined. Any action, movement, or anything else, that is imitated by a certain individual must have some interest for him (even in the meaningless, indiscriminate imitation of children, at least the

meaning of play or curiosity is noticeable). This interest may be determined by certain primary instincts like curiosity, combativeness, constructiveness, etc. Now, in order to fulfil that same interest, the tendency of imitation comes to the service of the organism

But it seems that it is not on this ground alone that Thorndike rejects the instinctive nature of imitation. He appears to question the spontaneity of the process of imitation when he proposes to explain the results of this tendency on the basis of learning from experience and the law of habit According to him, a child learns to speak not by imitation but by acquiring a habit as a result of experience gained through trials. The child cannot at the start produce sounds like adults, he gradually learns to do so by a process of trial and error. In the process of achieving the sound production, he simply attends to the movements of the other men and is guided not by a tendency to imitate but by "the original satisfyingness of the approval so often got by doing what other men do."[1] The acquirement of oral speech is a complex process where many other elements besides imitation are involved, but even in this complex process Drever quotes cases of children where such difficult words as 'rhinoceros' and 'hippopotamus' are repeated by them with great ease, proving the operation of imitation and not of trial and error learning McDougall holds the existence of this innate tendency on the basis of the observation of imitative movements in children at a very early age.

[1] THORNDIKE *Briefer Course*, page 45.

In the case of his own children he noticed[1] "one of them on several occasions during his fourth month repeatedly put out his tongue when the persons whose face he was watching made this movement." And so he was inclined to conclude "the existence of a very simple perceptual disposition having this specific motor tendency," as being 'innately organized' since at that early age it could not be acquired. There can, however, be no denying that in all acts where repetition of an individual's mode of behaviour is observed in another, it is not merely the element of imitation that is present but other highly complex factors as well, which depend on acquired experiences.

McDougall has distinguished three main types of imitation but he mentions two more as being less defined thus making up a total of five types. (1) This may be called sympathetic imitation. The response by crying (sound imitated) by smiling (facial expression imitation), by closing fists (movement imitated), when other persons are doing the same, is initiated by sympathy, but the repetition of bodily movements in all these cases is facilitated by the tendency of imitation. As will be seen later this imitation is of the unconscious type as differentiated by Drever. (2) Ideo-motor type of imitation—In ideo-motor action an idea present in the mind is automatically transformed into the action represented by the idea. When an acrobat is walking on a rope or a plank, or a cyclist is turning sharply round a corner in a circus, or when an

[1] McDougall: *op cit*, page 91.

actor on the stage is assuming extraordinary positions, some of the spectators quite unwittingly repeat those movements in themselves Here again the movement is largely unconscious McDougall thinks that many of the movements in children belong to this class. The child like a keen spectator is absorbed and interested in the movements of those around him, and "by virtue of simple ideo-motor imitation he picks up the peculiarities of gestures and the facial expressions." Children often watch a teacher's face intently and repeat some of his funny gestures. (3) Deliberate imitation to copy a certain ideal—"Some person, or some kind of skilled action, excites our admiration, and we take the admired person for our model in all things or deliberately set ourselves to imitate the action." Drever has also distinguished deliberate imitation, but as we shall presently see, his interpretation of ths form is wider than that of McDougall's (4) McDougall differentiates a fourth kind as intermediary between the ideo-motor and the willed imitation mentioned above. Children's imitation mostly belongs to this category They do not disect fully the ideal they imitate. What happens is, that they are struck by the effect produced by a certain action of any individual and they start imitating it without understanding the action they admire McDougall regards this to be a specialized form of ideo--motor action (5) Meaningless imitation of infants—Since infants cannot be credited with ideation no willed imitation or even ideo-motor imitation is possible This is really speaking the purest type of imitation which makes us accept 'imitation' as an innate tendency in

the human being.

Drever has divided all kinds of imitation including that coloured by acquired meaning into two main classes—(1) Unconscious, and (2) Deliberate He also differentiates two sub-classes—(*a*) perceptual, in which the individual who imitates begins the copying process immediately on the perception of the act which is being imitated; (*b*) ideational, in which the individual who desires to imitate does not do so under perceptual influence, but carries on the process later under the influence of the idea of the act.

In unconscious imitation the imitating individual unwittingly copies in himself what he sees in others. This process is slow but works surely, and is largely responsible for what we are, as a result of what may be called incidental education. Our manners, gestures, accent, mode of dress, etc., have come to us by a long and slow process of unwitting imitation We are all unconsciously coloured by the environment in which we live The tone of the school, from this point of view, is very important because a child learns more things by breathing the atmosphere of the school than by what he learns through books in the class-room. In unconscious imitation there is no differentiation between evil and good. In fact there is a greater chance of its working in a vicious atmosphere than in a nobler one for in the former the primitive tendencies of man find an easier and fuller scope of fulfilment than in the latter. Consequently the need for a wholesome environment, both at home and at school, cannot be overemphasized.

In deliberate imitation the individual who proposes to copy makes a definite attempt to produce in himself the model The deliberate copying may be, "either from interest in the thing itself, or interest in the result to be secured"[1] A good specimen of handwriting may be deliberately copied, either because the child is interested in doing things neatly, or because he hopes to win a prize. This kind of imitation undoubtedly involves varying degrees of volitional attempt on the part of the child. Imitation, ordinarily understood as aping or copying, does not appear to be anything worth encouraging, but deliberate imitation is an agency of high educational value Through it the child can be made to achieve as much of the ideal as possible. The extent to which he can be expected to exert his will, depends upon his age and mental development Through deliberate imitation the child realizes the limits of self-expression as much as the possibilities thereof. His idea of self as the doer only gradually becomes clear There is no end to the deliberate imitation which the child is made to carry on in school He has to imitate correct sounds in language, and to copy the best models of handwriting, sketching, modelling, and movements in physical training In the various social organizations in school, whether school unions, or parliaments, or health institutions, since they are the miniature representations of corresponding bodies in the wider society, the boys have to practise deliberate imitation constantly

[1] Drever *op cit*, page 88

As in suggestion so in imitation, it is said that the idea of self-inferiority lurks at the back of the mind of the imitator. The factor does not seem to operate in the case of unconscious imitation, but in the case of deliberate imitation in so many cases it is quite clear. When a child tries to imitate the dress of his teacher, or his mode of talking, or pronunciation, out of his own desires, he is so often under the influence of self-inferiority. The inferiority complex of Adler, or for the matter of that of all psycho-analysts, is distinctly a derogatory mental disposition, but all self-abasement which characterizes the actions of juniors in the presence of superiors (as in the case of the child and the teacher or the parent) cannot be so regarded. The self-abasing tendency tries to keep a social balance, and maintain the individual in his legitimate place. It unconsciously balances the self-assertion which, if let loose, will break all social propriety and solidarity.

But, of course, the teacher has to see, that because the child owing to an inferior position tries to imitate, he should make himself a model worth copying, so that the child's development may be satisfactory. A teacher who is unable to make his pupils regard him as a distinct superior would hardly be good enough for his business. The teacher should be regarded as superior and as a model worth copying. Assuming him to be so, there would be nothing amiss in advocating that children should be definitely encouraged to imitate his actions and attain the ideal personified in him. Even amongst the boys themselves there are some who happen to be superior to others, and en-

couragement should be given to those who are inferior to imitate what they see the superior doing so as not to look inferior. Imitation under such circumstances has been called 'emulation' by James. Emulation is necessary in school work. If the inferiors are not encouraged at this stage there will be the sinking in of the impulse, which will lead to the formation of a complex which may burst out in some of those highly unsocial feats of envy often exhibited by the losing individual.

We have spoken very favourably of imitation and advocated a necessity for deliberate imitation in school work But the question may be asked—Should that just be the aim in education? There is a cry for the self-realization of the individual, there is a demand that the individual must be provided with conditions under which he gets full scope for self-development. His creative tendencies should be allowed scope of expression so that he may rise to his full stature. Will imitation, however deliberate, however keenly directed, achieve this? The question may even be asked—Will not too much imitation stifle individuality, and leave undeveloped the creative power of the individual? Therefore while we do advocate imitation we cannot forget the other of James's two "legs"—'invention.'

Now, does not invention arise out of imitation? Is it not necessary, that since heredity provides us with no knowledge, in order to create new knowledge, some old ground must be covered? However original a Newton, or a Tagore, or an Einstein, there is a stage of imitation necessary for him before he can make any

original contribution. It is out of the routine initiative tasks of the class-room, or the simple experiments of the science laboratory, or the labours in a workshop, properly regulated, that sparks of originality arise. Of course, a system of education that begins and ends with imitation will produce little, but that which realizes its value as an aid to developing individuality will surely afford opportunities to each individual to rise to his fullest stature. "Imitation, at first biological, then reflective, is, in fact, but the first stage in the creation of individuality, and the richer the scope for imitation the richer the developed individuality will be."[1]

The School as a Psychology Group

The three tendencies—sympathy, suggestion, and imitation—which we have discussed, have a great social significance. None of them can operate in an individual standing by himself. It is only in social interaction that they find expression. In fact, they have been called the three phases of the gregarious instinct—suggestion (the cognitive), sympathy (the affective), and imitation (the conative). Now, since the school is a social group where the child does not live singly, these tendencies are in constant operation, and on the way their working is controlled and organized, will depend the growth and stability of the group.

We have called the school a social group, and as such it is different from a conglomeration of individuals It has a composite psychology which is not

[1]Nunn: *Education Its Data and First Principles*, page 141.

quite the psychology of the individual children composing it. One of the developments in modern psychology, is the study of the psychology of the group as such—group mind as differentiated from individual mind—a study developed admirably by McDougall in his 'Group Mind.'

Individuals get together either for a momentary and transitory purpose, or with a view to forming a group so as to ensure the continuity of certain ideals. Hence, psychologically, different types of collections of people may by recognized. But before we enter into a discussion of any of the types differentiated by psychologists, we have to be clear about a few fundamental facts concerning group psychology. Although a group is made up of a certain number of individuals the group mind is fundamentally a different mind. Common sense would say that the group mind is the average mind of the individuals composing it. But that is not so.

Le Bon has enunciated the Psychological Law of the Mental Unity of Crowds in the following words, "Whoever be the individuals that compose a crowd, however like or unlike they may be in disposition, intelligence, mode of life, or occupation, the fact that they compose a crowd puts them in possession of a kind of collective mind, which makes them think, feel and act in a way different from that in which they would feel, think and act in isolation"[1] A casual observation of the behaviour of a crowd round a hawker

[1] Le Bon *The Crowd*, page 29

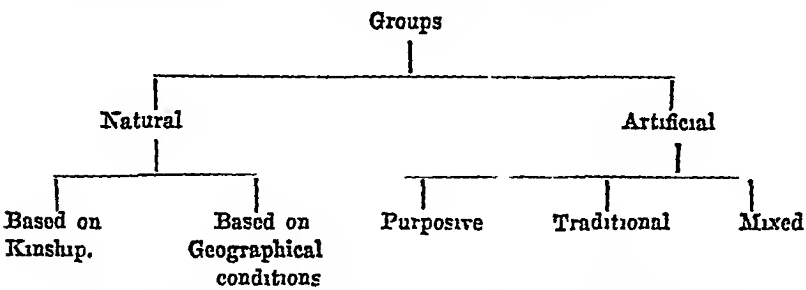
in a street, or of a gathering at a public-park lecture will bear out this statement. When there is an accident on the road,—a vehiicle riding over a passer-by, or colliding with another vehicle—a number of people gather round, and so often join in the altercation that ensues. Some of the individuals who indulge in that sort of behaviour would never do so in isolation To take another example, if there is a sensational lecture during riotous times by some one who can easily evoke sympathy and suggestion amongst the listeners, the crowd composed of normal individuals is converted into a collection of men ready to commit atrocities which they would ordinarily be ashamed of At certain other types of lectures there is also the possibility of an effect being produced in exactly the opposite direction, when the listeners are so much impressed that they rise above their normal behaviour, and become ready to exhibit a type of conduct much above their normal level. Sometimes after an impressive harangue, people promise to contribute to funds beyond their means, or give assurances of sacrifices never expected of them.

What really happens is, that owing to the crowd effect, the individuals composing it do not act or behave as their individual mentality warrants, but according as the mentality of the crowd directs. This crowd mentality, according to Le Bon, is not the average mentality —average intelligence, morality, will-power, etc.,—but is positively different. The intelligence is distinctly lower, the critical power of the mind operates feebly, the standard of morality is either high or low, and so also the conative power. We have quoted examples when

the morality and conative power rise high above the average, and also when they fall much below that.

According to Drever the chief psychological factor that brings about this change is the operation of the social tendencies sympathy and suggestion which we have discussed before Many people go about in the street or move about in the park, but it is some occasion, *e.g.*, the collision of vehicles, that at once brings them together . The thoughts and feelings of the individuals going about differently are turned towards one common direction Men are gregarious, and the sympathetic induction of certain emotions or the suggestion of certain ideas draws them together They keep together while these operate, and when they cease to do so the crowd disperses. During the time that the crowd is assembled the individual is lost in the herd as it were. Individuality is damped down, and the behaviour of every constituent is purely under the influence of what Nunn calls 'Mimesis,' which means the impulse to take into oneself the modes of feeling, thought, and action of others.

McDougall has classified groups thus:—



It is clear from the above that the classification is more on a social basis, as may be useful in the consi-

deration of politics, rather than on a psychological one. Drever has suggested a classification on a psychological basis, according to the level of the mental process characterizing the group

If the behaviour of human beings is examined it will be found that different individuals exhibit different mental levels. The lowest type of mind is that which is at the perceptual level, wherein the individual's behaviour has for its basis the operation of instincts for primitive purposes. The next higher is that which is at the ideational level, wherein the behaviour is controlled by acquired interests both intellectual and moral. These acquired tendencies direct the individual's behaviour into channels permissible by society. The highest is at the rational level, wherein the control is by ideals which have been evolved by the complete and perfect sublimation of the individual's tendencies. It is the task of education to raise the individual from the lowest to the highest level. We shall discuss this point in detail later.

As in individuals, so in groups Drever differentiates the three types—(1) at perceptual level, (2) at ideational level, and (3) at rational level. The illustration of each of these can be had in the crowd, the club, and the community or nation respectively. We have seen how a crowd is formed—people get together just helped by the operation of sympathy, suggestion, and imitation. There is a unanimous purpose guiding them all, but which has just sprung up then and there. They are conscious of it, but only for the time being. In Drever's terminology they have a 'here and now consciousness' of the common purpose Neither is the

gathering prearranged, nor is the conative factor quite settled. The thoughts, feelings, and actions of crowd are liable to change from moment to moment. In fact, its whole existence is evanescent and fleeting

In the club type of collection the aims are sufficiently clearly defined and prearranged. In its life, past memories and acquired interests operate quite freely. Although there is no common bondage between all the members, so far as all the phases of their social life are concerned, there is at least a tie that binds them all in so far as the activities of the club hours and club matters are concerned. When the ties become stronger, when the common motives pervade the whole of social life, when the aims and objects apart from being common are understood and realized by all, when the acquired interests of individuals are all merged for the benefit of the group, when the present takes into account not only the past but is also conscious of and actively attempts to safeguard the future, then the group becomes that of the highest type which may be called a community, or a society, or a nation. Really speaking it is the most highly evolved type of group life Such a group according to Drever, "has attained a high level of psychological development, in that it has not merely common traditions and sentiments, but is capable of common purposes and ideals, and in that it represents, not merely a fragmentary part of the real life of the individual members, but gathers together and focuses practically their whole life."[1] It need not be vain to

[1] DREVER *op cit*, page 215

think, that in the deliberations of this highly evolved social group the collective opinion would be superior to the average.

Now, the school is undoubtedly a psychological group, of which each child is a member, and wherein he lives and grows. Living in it, he has to achieve the best that he is capable of. "Social life is an unalterable fact." Why, then, in his period of development should he not be a member of a society? And at what psychological level should this group be organized? There can be no two answers to this question. The school has to be a social group at the rational level—at any rate, it has to tend to be so—where every individual is conscious of the common aim and works towards its fulfilment, where the stability of the group is guaranteed, based as it is, on the best that has been evolved in the human mind by way of sentiments and ideals, and whose future is ensured.

We need not stop here to discuss as to what should be done so that the group may be maintained at this level. Suffice it to say, that all those means, methods, and organizations which are conducive to making the members conscious of the aims and objects, and which provide them with sufficient opportunities for co-operation among themselves, and of interacting with other groups, must be introduced into the school life. Belief in the ideals of the school must be slowly developed, the discipline of the individuals to the wider interests must be maintained, the co-operation among the individuals for the benefit of the school must be ensured, the interaction between one school and another through

inter-clubs, tournaments, etc., must be provided, and, lastly, the individuals must be allowed scope to express the best that is in them so that the group may be more and more rational This done, the school will be maintained at the rational level and contribute largely to the uplift of the community or the nation.

PLAY

Of the various general tendencies the one which has the widest application in education is the tendency to play. The tendency has influenced the pedagogy of recent times to such an extent that the play-way as an important method in teaching has come to be widely recognized. The psychological nature of play has been extensively discussed in order to understand how it is evoked and how it operates.

The general tendency to play is one which man has got in common with other higher animals. Some psychologists are inclined to ascribe it to a definite instinct or mental disposition, but a careful analysis of any of the manifestations of this tendency, both in man and animals, will easily make clear the fact that it is not quite accurate to class it along with other instincts It can easily be seen that quite a number of tendencies, *e.g*, imitation, combativeness, constructiveness, etc., are sometimes realized in a play-way. Acting by imitating another individual, mockery, sham-fight, wrestling and tugging for purposes of combat, represent cases where these primary instincts find their expression in the form of play. It may thus be a tendency to fulfil the operation of some of

the other primary tendencies. Nevertheless, it is a tendency which is inborn and spontaneous, requiring no training or education for its operation.

Play is expressed both as an individual tendency and as a phase of the herd instinct. In the latter case, it necessitates social interaction, and consequently is regarded as having a great social value. The young one of an animal as well as a human child, both can be seen indulging in individual play, especially when carrying on experimental plays like making random movements, changing places, practising bodily movements like creeping, crawling, running, etc. Leaving a few of the plays which are of definitely individual nature, almost all have more or less some social reference. Even when the little puppy is chasing and tearing a ball, or the solitary child is playing with his blocks and toys, some social reference can be seen in the activities which are carried on. In group games, sex plays, and all the little make-believe things which children carry on, we see the social interaction in its fullest form. The significance of play in the social development of the child is very important because most of his plays even from the early childhood largely necessitate social interaction.

WORK AND PLAY

Play, whether individual or social, whether of the experimental, or the hunting, or the imitative, or the intellectual type, has been distinguished from work. Now the question is,—in what way can we differentiate between activities which are playful, *i e.*, which are car-

ried on in a play-way, and those which are of a serious nature and which we designate as work? It is said that play is that activity which is carried on just for itself and not for anything else, whilst work is that which is carried on with some other object in view than the activity itself. If football is played for the sake of playing, it is play; if it is played with a view to earning a livelihood, it ceases to be so. Wrestling may be a pastime with boys but for state wrestlers like 'Gama' it is hardly ever the same.

Every activity in so far as it is a process must have certain aims and ends with respect to which it is carried on. There is a purpose behind every action. In every instinctive act that an organism carries on, it has a specific 'worth-whileness.' Now, the worth-whileness in play is something which is the activity itself. According to Drever, "in play the value and significance of the activity is found in the activity itself, whereas in work, the value and significance of the activity are found in an end beyond the activity "[1]

What is play to one becomes work to another if carried on with some ulterior motive One thing which is an important characteristic of play is, that it always carries the mind towards the joy polarity . In every instinctive activity, when there is the fulfilment of its normal course and the worh-whileness is being satisfied, there is a feeling of enjoyment. The achievement of the end means the joy. Consequently, in play, since the end to be achieved is the activity itself, there is enjoyment of the activity. We aim at enjoyment and

[1] DREVER op cit, page 101

we get it during the activity. In the case of serious activity, the enjoyment in the real sense comes not during the activity but when the object of the activity is achieved. If, however, despite this, serious activity (having another object to be achieved), is carried on in a play-way, *i.e*. the spirit of play permeates the mind while the activity is proceeding, then there is a possibility of enjoying the activity. Work done in a play spirit is evidently less straining to the mind. The introduction of the play-way in education is only an endeavour to take advantage of such a principle.

Something more needs to be said about the end or object to be achieved in play and in work. In play, of whatever type it be, it is certain that there is some end to be achieved. If it is football or hockey then goals have to be scored and the match won; if it is cricket, then runs have to be obtained and the opponents defeated; if it is bridge games have to be scored and the rubber won. After all, are not some of these ends similar in nature to the objects that have to be achieved in work? If it is business, goods have to be advertized and sold, if it is medicine, the patients have to be cured. How are these objects different from the ones aimed at in play?

Drever draws a vital difference by saying that the ends we want to achieve in work are the ends of the 'real world', while the ends to be achieved in play do not belong to the 'real world' but refer to a 'make-believe one.' The ends of the real world are those which are imposed *ab extra,* and to which the individual working has to make himself subordinate. In the

life of the real world there is a system of values laid down, and all activities carried on with reference to it must be governed by these values. The individual entering upon any activity which is work is imperatively subordinate to certain rules and regulations. In a make-believe world the ends imposed are not from without but are voluntary. There is nothing to which the doer is imperatively subordinated, but the restrictions he puts upon himself are of his own choosing. Of course, for the time that a player plays, he subordinates himself to certain rules and regulations such as he has agreed to. He makes a world for himself and acts in it.

In order to bring out the antithesis between play and work, Nunn analyses two simple activities, like eating dinner and playing auction bridge, which represent in certain respects the activities, work and play respectively. In the case of the former, "the mainspring of the activity is obviously an imperative, which no one can ignore and live. Nature says, 'Thou shalt eat' " In the case of the latter, although there is the bondage of rules "the acceptance of rules is itself voluntary" According to Nunn, "an agent thinks of his activity as play if he can take it up or lay it down at choice or vary at will the conditions of its exercise; he thinks of it as work if it is imposed on him by unavoidable necessity, or if he is held to it by a sense of duty or vocation "[1]

The question, however, remains as to what the

[1] NUNN op cit, page 89

position is when the professional bridge player plays for the stake, or when the professional cricketer plays to earn his livelihood. From the point of view of the professional player, we called such an activity work. We would regard it so, in so far as while giving the bids or leading the cards the bridge player is conscious of the fact that he does so for earning money. He is then thinking in terms of the real world. But at certain moments during the game he possibly loses this consciousness and just plays the game. Then, he is for the time being carrying on in the make-believe world, and the activity can be characterized as play. In most of the professional players, there is generally a constant fluctuation of attitude, sometimes taking them to the world or real life and at other times detaching them from it.

In children's plays and games there is a good deal of the make-believe element. The imitative games, playing the soldier, or the driver, or the nurse, the constructive games like building a miniature house or a garden, the dramatic games like acting the roles of kings and queens, etc., have all reference to the make-believe world. Childhood is the period when every child prefers the world of fantasy and imagination to the real one. The tendency of self-assertion is powerful in him. He does not find sufficient scope for the expression of this instinct in the real world whose conditions he is unable to control. Consequently, he resorts to playing various roles in his make-believe world, where he has the freedom both of planning the activity as he chooses and of giving it up whenever he desires. He wants to be the milkman, he wants

to be the driver, he wants to be king of myths and tales. The real world gives him no scope, and in his play he creates the condition for his self-expression We shall return to this point again when considering imagination.

Theories of Play

In order to explain the basis of the innate tendency of play various theories have been advanced. Each emphasizes some special phase of the tendency. Some seem to be in conflict with one another, but they have to be regarded as complementary in explaining the phenomenon.

The Surplus Energy Theory—This was first enunciated by Schiller and was later supported by Spencer. Every creature in order to sustain its life has to expend a certain amount of energy in carrying on its life process The energy that is left over and above this is responsible for the origin of play The young, in many species, have not to expend any energy in procuring food, etc , for themselves, because their parents do it for them. The extra energy that is thus available is expended in play. There is thus more of surplus energy in the young ones of higher animals, and hence they play more than those of the lower ones The latter are thrown on their own resources right from the very beginning

The superabundance theory regards play as a safety valve through which the extra energy is let off The theory evidently starts with a conception of physical energy and does not take into account the potential psychic energy of the organism It undoubted-

ly explains the more or less aimless movements and activities of animals as well as of children, in which the surplus energy is utilized. It does not stop to explain why the play of different animals differs, and why an obviously fatigued child plays at all. According to it, one is led to conclude that play is not possible at all, when the extra amount of energy is not available. It would be impossible to explain the play of weary child on the basis of such an assumption. Children after returning from school engage themselves most enthusiastically in play of all kinds

The theory assumes that during childhood the organism possesses a fund of energy which is much more than it needs for its life maintenance, and hence play is a particular characteristic of childhood and youth. The safety-valve idea of the child's play differs from the letting out of extra power from a physical engine. In an engine the surplus energy, whether steam-power or electricity, which is developed, may be utilized for any other purposes that the mechanic may have in view, but it can be of no use to the growth of the efficiency of the engine itself. But in the case of the child's play, the process helps in the growth of the child, and in perfecting his sensory and physical organs.

The Recreation Theory.—The chief advocate of this theory was Lazarus of Berlin. According to this theory, play is meant for recuperation. When the mental and physical powers have been fatigued the organism has to turn to play in order to recuperate the energy expended. Recreation, *i.e.*, change of activity

is the antidote of fatigue, and hence play is necessary. The extent of fatigue assumed, however, is not so much as to bring the organism to a state when nothing but rest in the form of sleep can recuperate. The child fatigued by mental work takes to games, the business-man tired of his office work goes off as soon as business is over to have a game of tennis. This theory explains only one aspect of play—the play of the adult or child for purposes of recreation. It offers no explanation for the varied types of play which are played by children or the young of animals. They carry on a good deal of play for its own sake, and in this theory we find no explanation of the same.

The Anticipatory or Practice Theory.—This was first suggested by Malebranche, but it was enunciated and developed by Karl Groos Groos studied the play of the young animals, and found that in the various play activities which they carry on, they prepare themselves for the business of their adult life The kitten plays with a rag or a ball by running with it all over the room. It sometimes pretends to bite it and tear it. The little puppies enter into a combat, wrestle with one another, and roll on the ground The kitten in its play practises hunting and preying upon the mouse that it will chase a little later. The combat of the puppies also means their practising the skill of fighting which will be needed when the play period of life is over. In the human child too, we see quite a number of forms of play which clearly show the practice element for the preparation of life The constructive play of the infant in which he builds houses, forts, carriages, etc , the combat

play of the boys wrestling, tugging and group games, the doll games of the girls, all indicate preparation for the real tasks of life.

Since the make-believe world of childhood is to be replaced by the real world of adulthood, playing during the preparation period of life is necessary in the interests of the future. Now, the less complex the adult life of the organism the less is the need for practice play, and the more highly evolved and complex the adult life the greater is the preparation through play that is necessary. The higher the animal the greater the preparation it needs, and consequently the longer is its period of immaturity. The young of some of the lower animals like the ants, bees and wasps, etc., set upon their task of life without any preparation period. In higher animals like the cats, dogs, monkeys, etc., we find that there is a well-defined period of immaturity during which the parents look after the young ones. In these animals the young ones play during the period of immaturity, and practise the activities which they will have to carry on later. In man the period of immaturity is about one-third of the whole period of human life. Hence, in case of the human child, the period of play is prolonged and great variety introduced in his play. Even amongst human beings, it has been argued that in the more highly civilized peoples the period of immaturity or the period of preparation for life is longer than in case of the barbaric ones. It has been very aptly remarked that 'we do not play because we are young, but we are young in order to play.'

The question arises as to why the period of play or the stage of immaturity differs in different species, being longer in the case of higher animals. In the animal world there are certain lines of development which proceed after the theory of parallelism. The more highly evolved the animal the more complex a nervous system does it possess. Similarly, the higher the animal the more capable it is of assimilating experiences and making its behaviour complex.

For all those animals whose adult life is not to be on the primitive instinctive level, but who have to acquire modes of behaviour and skills, the period of youthfulness is prolonged. The period of immaturity with its playfulness is merely the scope given to the organism for adapting itself specially to its complex needs. According to McDougall, "the youthful play tendencies are, special racial endowments of high biological utility, the products, no doubt, of the operation of natural selection."[1] The living organism, during the period of play, tries to adapt the various instincts which begin to ripen, so that they may become capable of yielding the behaviour needed for efficiency during the period of life to come. That is why at different periods of childhood there are different types of games which are played by children The length of the play period, and the necessity of great modifications of the innate tendencies, owing to the demands of the complexity of adult human behaviour, account for the great variety and complexity of the plays of the human child.

[1] McDougall *op cit*, 93

One thing about the play of children and animals which requires attention is, that although, as we have said above, play is practised when instincts ripen and is practised for their modification, when an instinct is evoked in the play form, it is different from that which is evoked in a natural situation as a response to a proper stimulus. Instinctive behaviour is different from the play behaviour of the same. If we take the case of combat exhibited in a play-way, *e.g.*, in the wrestling of boys or sham fights, etc., we find that in the play behaviour, not only is the corresponding emotion missing, but the whole behaviour is controlled by the rules of the make-believe world. The play combat is not the combat of the real world. When a boy boxes another he does not box so as to injure the other fellow. He knows he must keep a check on himself—a check, which, as is characteristic of play, is entirely self-imposed. The restraints of the make-believe world gradually by training become the restraints of the real life.

Whether Groos's practice theory holds for all cases of play or not, it is difficult to say, but it undoubtedly explains quite a large number of the forms of play of the higher animals. According to this theory, apart from the fact that many of the skills and modes of behaviour needed in adult life are learnt, there is an educational corollary that follows. It is through practice during play that the sensory-organs and limbs of the body are trained—a training which is essential for the efficiency of adult life.

The Recapitulation Theory.—This has been

enunciated by Stanley Hall This theory is biological in its conception. As the anticipatory theory looks forward in the lifetime of the organism, this looks backwards and considers the evolution of the same According to this theory, the animal in its play re-traverses the stages which the species has passed Hall criticizes the view of play, as practice for adult activities, by saying that it is "partial, superficial, and perserve." According to Hall, Groos's view "ignores the past where lie the keys to all play activities True play never practises what is phyletically new, and this, industrial life often calls for It exercises many atavistic and rudimentary functions, a number of which will abort before maturity, but which live themselves out in play like the tadpole's tail, that must be both developed and used as a stimulus to the growth of legs which will otherwise never mature."[1]

From Hall's point of view the various games that children play are simply revivals of the various stages of human history The pre-historic man was characterized by certain wild activities, the uncivilzed Negro has certain hunting and preying activities, and the child in indulging in some of the games which are and have been the characteristics of the less civilized races, only repeats in himself the physical activities of those periods of racial history. Of course, like the tail of the tadpole these activities are transitory, and the child leaves them after a certain time But again, like the tail, these activities which are discarded after a

[1] STANLEY HALL *Adolescence*, Volume I, page 202

time, do him immense good, so far as his growth is concerned.

If the question is asked as to why it is necessary for the child to repeat some of these discarded activities of the past, then we find an explanation given in the nature of 'catharsis'—a view as old as the time of Aristotle.[1] Not only do we find children, after they have passed a certain age and played out some games, returning to them again, but we find adults also resorting sometimes to some of these play activities which are characteristic of the primitive people. It is said that it is not possible for man, however civilized he be, to cast off altogether the primitive tendencies he

[1] BURNET: *Aristotle on Education*, pages 124-25.

"Music is to be studied for the sake of many benefits....It is to be studied with a view to education, and with a view to purgation ..."

"The Pythagorians used medicine to purge their bodies, and music to purge their souls....The word 'Katharsis' is a medical term, and that it means a purge.... Aristotle is always strongly influenced by the medical associations of the terms he uses ...It was a fact of experience that persons who suffered from an excess of wild religious emotion could be cured homœpathically. If they were systematically roused up to frenzy by the wild strains of the flute, the result was that they worked off their surplus emotion and were restored to a calm and normal condition. .. . This is only an extreme case of what we find everywhere else We are all in a greater or less degree, susceptible to feelings like pity and fear, and these may easily accumulate in us and lead to a morbid sentimentalism which is inconsistent with the requirements of good life. If, however, by means of music or any other art, these emotions can be systematically stirred up, they find a natural outlet in that way, and we are at once alleviated When we see a great tragedy, our accumulations of emotions are all discharged upon a great and worthy object instead of forming a constant source of weakness in our own lives."

possesses. On so many occasions he tends to regress to the primitive or infantile mode of behaviour. Whenever the bonds of society are at all weakened, such a regression is facilitated, although even without that, man, since he cannot cast off his primitive nature, is liable to regress to what will be deemed by the civilized society vice, cruelty, misconduct. etc. Now according to the catharsis theory, this tendency of regression to lower levels is purged out in the form of play. Play, as it were, is a subsidiary channel in which the mental energy behind regression is directed, and thus a sort of sublimation takes place In the case of the boy the cathartic operation takes place oftener than in the case of the adult

While the two theories, the anticipatory and the recapitulatory, apparently seem to point in opposite directions, Nunn is inclined to hold that they are "complementary rather than opposed" The types of play adopted very clearly show that they are the repetitions of some of the past stages, but it is equally true that they have a future reference and are of "direct value for the adult life". The past provides the material but the practice is for the future Man possesses certain hereditary mental dispositions which are a result of the biological evolution of his species. They may be called racial endowments, but they are of high biological utility for his future.

According to Nunn, the types of play-activity called 'organized games' and 'sports', which are resorted to by adults, are based on the principle of

'relaxation'. To a certain extent the adult by indulging in outdoor activities recuperates It is fatigue that necessitates the outdoor activities, and so he indulges in games and sports. Obviously the recreation theory holds in this case. But this does not explain every aspect of the question. The adult forms of play activities—football, tennis, dancing, shooting, and sports—are based upon elements which have reference to the native mental dispositions of man. When the adult indulges in these he works on Hall's theory of atavistic reversion The acquired dispositions of the adult are as complicated as the complex civilized society, having been evolved by constant reactions in that complicated environment. The adult's behaviour has all the while to be subordinate to these acquired dispositions, which involves a good deal of strain. Consequently, now and then, he seeks to be freed from the control of these dispositions and let himself be freely guided by those dispositions which are native and simple. This relief he finds by turning to games which, as we have said, tend to give expression to the native dispositions in a sublimated form.

Play-Way

While differentiating between work and play we emphasized the fact that in play there is essentially the enjoyment of the activity itself. When the element of enjoyment is introduced in a serious activity we say that it is being carried on in a play-way. Serious activities which we call work are not all of the same

value and worth. They range from sheer toil to most ennobling activities. Nunn emphasizes that just as there is a hierarchy in work in the same way there is to be found a hierarchy in play. "There is play which is merely a trivial means of consuming time, there is play with a definite educative virtue, and there is play which is full of high seriousness"[1] As we go higher up in the scale of play we really get to something that is not trivial but ennobling and elevating. Ideally speaking, play and work of the highest types become the same

The only difference that really exists then between work and play is not a difference in the nature of the activity that is carried on, but in the mode of carrying it on and the spirit of the agent When we introduce the play element into the tasks of the school, we do not propose to remove the child from the serious activities which are for preparation towards real life, but we introduce something in the mode of carrying on the activities so that they become really enjoyable to the doer What gives enjoyment to the doer of the activity done in a play spirit, is the comparative freedom that he has in carrying it on An activity in which the doer is allowed freedom of self-expression would always give him enjoyment. Self-expression and enjoyment are always present in play activities, and if the play-way is to be introduced in the methods of education then it must offer full but legitimate scope of self-expression and consequent enjoyment to the child.

[1] NUNN *op cit*, page 102

In recent times quite a number of modern methods of teaching and training have been introduced in schools, *e.g.*, Montessori method, Heurism, Dramatization, Dalton Plan, Free Discipline, Boy Scouting, etc. Some of these have been definitely designated play-ways, and some have not. Yet a close analysis of any of them will show that it aims at giving the child freedom in self-expression and enjoyment of the activity, in so far as that is commensurate with the best interests of social cohesion. Education aims at the fullest development of the individuality, so that every one may be able to contribute to the progress of the group in which he lives, and consequently he has to be allowed the full scope of self-expression, with the safeguard that in so doing, the social organization is not allowed to break down. (When unlimited freedom degenerates into liberty there is grave danger of this breakdown.)

Before discussing the various self-expressive devices and methods, and assessing their values in the scheme of education, we shall discuss the types of various plays, and see which are characteristic of particular ages of childhood. Karl Groos has differentiated the important types of play, some characteristic particularly of animals and others of the human beings. We shall refer only to those which have a distinct educational bearing in case of the human child.

(*a*) Experimental play:—This is exhibited in the child's random handling of objects—a process with the help of which he gains sensory experiences This form

of play is necessary for getting acquainted with the environment in which the child lives. It is specially characteristic of children during their period of infancy. The young of certain animals also indulge in this sort of experimental play—the objects round about them being limited to the parts of the body of self or the parent, or some such things This sort of play is typically individual

(*b*) Movement play —This is expressed in the random movements which the young ones of some animals and children carry on. The motor play of the child is distinctly a method of preparation for future life. It is through movements that muscular control is achieved. Little children make meaningless sounds, run about aimlessly, sit here and there, and exhibit complete restlessness at times. These activities may be individual but they are liable to be aggravated in the company of others. After a while this random running about is converted into such games as the hide and seek There is also introduced into the play of the human child an element of imitation. The creeping, crawling, hopping during this period show that the child imitates the movements of certain animals.

(*c*) Constructive play:—This represents the kind of play in which the constructive propensity of the child finds expression. The baby builds various objects with blocks and sticks, the little girl makes houses for dolls, the boy constructs simple instruments and objects while playing with the Meccano. Some of this is

the imitation of the adult activity, and thus according to Groos a preparation for future It may even be interpreted as an aspect of catharsis—the child doing some of those things in his little world which he is unable to do, or at any rate not allowed to do, under the conditions of the real world. He cannot build a house or a bridge in the real world, and so he attempts this miniature model of the real object in his make-believe world. Constructive plays are both individual as well as group. The mud forts on the banks of the rivers are never made alone But all construction, whether done individually or in group, has a definite social reference Simple constructive play is a characteristic of early life, but complex constructive play goes on in the pre-adolescent and even adolescent periods of life.

(*d*) Fighting plays —As the young ones of animals carry on several frivolities with a view to practice hunting of prey, the human child also indulges in various types of combative plays Some are duels like wrestling and boxing, others are group activities like team plays. Combative plays, since they have their origin in the corresponding instinct, are more characteristic of the male sex than of the female. The team games of boys have a definite future reference, because they are organized with a view to train the character of the boy—a training essential for the adult life In all organized games and sports, on the one hand there is training given for the future, and on the other catharsis is allowed to operate. Combative plays begin after the infant period. During pre-adolescence they

are generally simple and of competitive type But as adolescence sets in boys begin to take interest in group competitions and team work.

(*e*) Definitely intellectual, emotional and volitional plays.—These are characteristic of the human child only While differentiating intellectual plays from others, which we have discussed so far, we have to be very clear about one thing. So far as the play of the human being is concerned, except in purely sensory variety, some element of intellection is always involved in the activity In simple constructive plays, combat games, etc, children have got to make use of mental powers varying only in degree according to the type of play In organized group games and team work there is a good deal both of the emotional as well as the intellectual element that is involved

What we call purely intellectual plays are those which are organized just for purposes of making the child exercise certain mental powers in a play-way. The simple word-building exercises and cross-word puzzles which are given to be solved, the playing at shop which children have to do in arithmetic, make it necessary for them to use their higher mental powers In dramatization when children have to play the parts of the various characters in literature and history, they are not only made to repeat the speeches of the characters accurately but also to feel their sentiments No acting is natural unless the actor gets into the emotional attitude of the character concerned In volitional games direct exercise of the will-power is involved

There are certain games which demand a good deal of mental endurance and control on the part of the player. Simple volitional plays of the following type are played by children:—

(*i*) A tells a funny story to B, and B is not allowed to smile. (*ii*) A and B make faces and keep looking at one another; the one who laughs first loses the game.

Whether designated as play-way or not, as we said before, various devices are employed in teaching and training the child, in which the spirit of play is introduced in the serious activities of the school. Whenever the child is given the opportunity for self-expression so that he may enjoy the activity, play-way is automatically introduced. We now proceed to consider the various devices.

The Montessori method of teaching the infants, definitely takes advantage of the play tendency, and is practically based upon it. The infants are given various objects to play with, and thereby through sensory experience to gain knowledge of their environment. Intellectual training proceeds side by side with physical development which is assured by plenty of scope for free movement in the various activities. It is in the kindergarten stage that the child is first made conscious of his being a learner at school. His impressions of school and education begin to get formed. If at that stage he is offered free scope of self-expression, as is assured through play-way, then his attitude as a learner develops on very satisfactory lines. Play-way is the characteristic of every Montessori school.

There are schools for infants in practically every civilized country now, which rely primarily on free play as a method Miss Pratt of the Play School in New York, who is a great exponent of the play method, has her plan which aims "to offer an opportunity to the child to pick up the thread of life in his own community, and to express what he gets in an individual way." "The experiment concerns itself with getting subject-matter first hand, and it is assumed that the child has much information to begin with, that he is adding to it day by day, that it is possible to direct his attention so that he may get his information in a more related way; and with applying such information to individual schemes of play with related toys and blocks as well as expressing himself through such general means as drawing, dramatization and spoken language"[1].

Dramatization is freely employed in teaching literature and history. It is used as a method not only in teaching higher classes but with little children and infants as well. In simple story reading each child is given the part of one of the characters of the story, whether it be of an animal or a human being or a fairy. Through acting the meaning of the whole situation is comprehended by the child, and reading and understanding go side by side The probability of reading becoming mere sound production of isolated words is minimized. "Dramatization secures both attention to the thought of the text and a spontaneous endeavour, free from pretence and self-consciousness, to speak loudly enough to be heard and to enunciate distinctly"[2].

[1] J. DEWEY AND E DEWEY· *Schools of Tomorrow*, Ch V, pp 116 17.

[2] DEWEY *op cit*, page 121

The Dalton Plan, which represents a most dramatic and well-organized scheme to break away from the routine and formal work of the class room, is really based on the principle of giving the child the fullest freedom of self-expression It puts on him hardly any restrictions as regards the periods of work. It affords him opportunities to continue any study for whatever time the child pleases It binds the child to a syllabus of as minimum a formal nature as possible by giving him suitable assignments to get through The formal class-room study is replaced by free laboratory investigation. While the method aims at throwing the fullest responsibility on the child, it proposes to do so by giving the child freedom to think, to act, and to discipline himself generally The Dalton Plan essentially takes advantage of the play spirit and tries to introduce it in the serious activity of study.

The Project Method may be a method designed to socialize education, to introduce the element of reality in the tasks of school, and in general to make the boy recognize the purposive element in his work. But once a project is laid out, in the working of it the children have the scope of self-expression They enjoy the activity as it consists of carrying out the real tasks of life in their miniature world—something which they want to do and crave to achieve. The serious activity is thus carried through in a play-way.

The Boy Scout and Girl Guide movements in various countries, and the Youth movement in Ger-

many must largely be regarded as phases of the educational movement An analysis of scouting will show that almost every type of play, from the simplest physical movement to that demanding the exercise of higher mental processes, finds a place in Scout Activities. Scouting attempts to emphasize the importance of utilizing the leisure time of the child According to Aristotle, "True education consists, in the ability to enjoy profitably one's leisure" Scouting ensures the useful spending of extra time It is again related to the life of the child The various activities are intended to direct his innate tendencies as they ripen, into proper channels. Whether the founders of the movement were psychologists or not it is difficult to say, but they undoubtedly made use of some of the important principles which psychology offers by way of help to the teacher

From the point of view of the play-tendency we find that the scout activities are based on the findings of almost every theory of play. Stanley Hall would be amply satisfied to find that in scout games and camps (in yells, in camp-fire in spooring, etc) the atavistic reversion is taken ample note of An examination of the list of proficiency badges (the swimmer, the artist, the first-aider, the signaller, the bookbinder, the observer, the collector, etc) will show that through play is aimed a thorough preparation for the adult life Ample scope is provided to the child to relieve his feelings through catharsis, and to direct profitably his bubbling energy of childhood as well as of boyhood This movement has been able to show means and methods

by which the tendencies of boys and girls can be sublimated, particularly during the period of adolescence which is universally admitted to be a critical period of life. In general, it would not be wrong to say that there is no better organization allied to school than that of Boy Scouting. It gives boys ample scope for self-expression and enjoyment, and at the same time teaches them discipline of the right type. It is needless to emphasize that in order to achieve the aims of scouting the right type of scoutmaster is essential.

The Youth movement (in Germany) is a post-war organization connected with education. It is meant to afford facilities to the youths of the country during their post-school but pre-vocational period of life, to live and move freely in contact with nature, so that they may be trained to enjoy their leisure hours profitably.

The energy of youth is most powerful. Undirected and unutilized in the grind of professional life it is bound to let itself flow, probably into channels. detrimental both to the individual and to the society. Consequently, it is proper to organize the youths and let them indulge in activities which afford them ample opportunities for a free and healthy life and prevent them from going astray. "The youth learns and grows not only when at work or at school. Leisure is of quite essential importance for the development of his personality both physically and mentally. Leisure is for the young man the only time during which he lives according to his own personal impulses, and de-

sires to discover and realize for himself the meaning and value of his life"[1].

The youths of both sexes tramp over the country in big groups enjoying fresh air and developing their limbs. They come in contact with rural and urban life of parts of the country other than their own They camp in 'Jugendburgs'[2] where they have music, dancing, social history, manual work and other things best suited to their tastes In their activities there is catharsis and also preparation for future life. The movement is in its infancy and to picture any great future for it may appear only a pious hope But the results achieved so far do make the orgaizers hopeful of creating in the land youths who would not only be physically healthy but also possess the mental susceptibility for everything that is good, genuine, true, and beautiful.

[1] *Freizeit und Bildung in Deutschland,* page 9

[2] *op cit,* page 87.

"The existing German Jugendherbergen are to be found under such roofs as schools and other public buildings, gymnasium, club-houses, homes, barns, hospices, ancient city towers, castles, unused factory rooms, peasant homes, sanitoriums, monasteries as well as in their own buildings Hotels are avoided as much as possible though the present building scarcity renders then almost indispensable Every Jugendherberge has at least two separate sleeping sections, one for each sex Large Jugendherbergen not infrequently contain numbers of smaller bed-rooms Sleeping equipment consists of cots, or wooden frames covered with straw sacks or mattresses and wool blankets In a great number of Herbergen of the temporary kind the sleeper must lie directly on the floor with straw as bedding Many Jugendherbergen contain a social room with homely furnishings, a kitchen with cooking and washing fixtures, a library, and a field for dancing and playing, etc"

References for further reading

1 DREVER · *Instinct in Man*, Chapter VIII.

2 „ *An Introduction to the Psychology of Education*, Chapter VI.

3 NUNN : *Education: its Data and First Principles*, Chapters VII and VIII.

4 HALL : *Adolescence*, Vol. I, Chapter III

5 MCDOUGALL : *An Introduction to Social Psychology*, Chapter IV.

6 MCDOUGALL : *Group Mind*.

7 RAENY : *The Place of Play in Education*.

8 CALDWELL COOK : *The Play Way*.

9 KARL GROOS : *The Play of Animals*.

10 ROSS : *Groundwork of Educational Psychology*, Chapter XV.

CHAPTER VI

SENTIMENT, CHARACTER, AND THE WILL.

Instincts are the mental structures with which we are born. They are the innate controls of our conduct and behaviour. As we react in our environment, our innate controls of conduct are modified Every reaction, however simple in nature it be, modifies our mental disposition to some degree Generally speaking, no experience or mental process, however crude and undefined it be, goes to waste. Through our responses to the various situations we gradually acquire dispositions. Acquired dispositions are undoubtedly based on native ones, but in controlling our behaviour after they are acquired they supersede the native ones As mental growth proceeds, these acquired dispositions become the real controllers of our conduct; in fact, in the case of an educated human being, they totally eclipse the native dispositions in controlling his whole behaviour except when the social contact is altogether broken. As further mental development goes on, the acquired dispositions organize themselves into certain systems, each system controlling action in a particular direction The different systems in turn are organized into one larger system In this chapter we shall examine the nature of these acquired dispositions, their organization into systems, and their general influence on the behaviour of the individual

Sentiments

It is a characteristic of the psycho-physical organism that it is modifiable. All biologists and psychologists accept the possibility of modification, although there is difference of opinion between them as regards the manner in which the modification occurs. On the physiological side every reaction tends to modify the neutral structures and connections; on the psychical side there is a corresponding modification of the mental dispositions. The factors that play the important part in this modification are—(1) the native dispositions, and (2) those items in the environment which present themselves to the consciousness of the organism and become the occasions of its reactions.

So far as native dispositions are concerned all individuals are endowed with them How far and in what directions they can be modified, will depend on what the environment offers by way of situations for their expression and reaction. It is only those objects which cross the consciousness that can arouse emotions, and it is in connection with these alone and not others, that we can acquire any dispositions. Through our reactions with certain objects, through constant arousal of one emotion or another in connection with them, we acquire some dispositions. For each one of us, certain objects become the centres of definitely organized groups of emotions (which are aroused in course of our reactions towards them) and these organizations we call sentiments. Guided by some

instinctive disposition we perceive certain objects. The primary emotions play round them, sometimes it is one emotion playing over and over again, in other cases there are two or three. There is gradually a fusion of these into what may be called a complex emotion. This process modifies the disposition which lies behind and generates the emotions, so that in our subsequent behaviour towards the object the acquired disposition arouses the new complex emotion.

Psychological Nature of Sentiments

The word 'sentiments' is ordinarily used to signify the sum total of an individual's feelings and emotions. It includes all the affective phases of all the psychical processes that an individual can carry on. One individual is regarded as more sentimental than another just because in him can be aroused feelings and emotions not aroused in the other or aroused much less strongly. Modern psychologists have disputed such a vague and general interpretation of sentiment, and specified what they regard as the true nature of it. Shand was the first to clear the ground and define a sentiment as "an organized system of emotional tendencies centred about some object." McDougall, Drever, and others have accepted this view, and with its help explained many facts about mental experience especially so far as its affective phase is concerned.

Since, in the formation of a sentiment, an organization of emotional tendencies takes place, it is obviously a later product, and can in no sense be considered

as innate. This organization of emotional tendencies modifies and develops the mental disposition, and the sentiment thus becomes an acquired and lasting interest for an object. In this sense sentiment is a mental structure and not a mental function, as is sometimes wrongly imagined. Sentiments must be regarded as acquired mental dispositions or structures which influence our conduct in relation to the objects around which they have been formed. Every sentiment, according to McDougall, is an "enduring conative attitude toward some object induced by experience of that object."[1]

There are certain objects which we begin to love, others which we begin to hate. Whenever we perceive them we feel for them so, and we behave towards them accordingly. An object which is an object of hatred to A. may be an object of love to B., depending on how emotions in each case have been organized around the object A. loves a book, but B despises it It is also possible that an individual A. may have a sentiment for an object, whereas B may have none for it. A feels strongly for a man, but B. is altogether indifferent to him In the latter case no emotions, positive or negative, have played their part. It may well be possible that A, may have a sentiment for a particular object but not for all objects of the same class. A. loves a certain school building but not all school buildings It all depends on the play of emotions, and the consequent formation of sentiments.

[1] McDougall *An Outline of Psychology*, page 419.

Each one of us has sentiments for certain objects. We have a sentiment for the room in which we have lived, for the school or college in which we have been educated, for the articles of furniture and other things which we have used or have been associated with. Our objects of sentiments are different, but each one of us has some sentiments which have developed around objects in our environment. None of these sentiments exist at the time of birth They are all acquired through our subsequent reactions with the objects Not only do we develop sentiments around objects and persons but around ideas and ideals as well We develop sentiments for virtues and vices as we do for men and things Our moral behaviour is largely determined by these.

Formation of Sentiments

Sentiments around whatever objects or ideas they become formed are, to start with, products of experience. This experience according to Drever is not an "experience at the perceptual level of intelligence but involves the ideational" In the formation of a sentiment, therefore, "the psychical integration is on a higher plan altogether".[1] This point of view immediately brings us to the consideration of different levels[2] of psychical integration or mental development

The mind starts with a bundle of instincts which make it perceive certain objects and behave towards

[1] Drever. *Instinct in Man*, page 208.
[2] See Chapter V, page 127.

them in specific ways. Their sum total constitutes the whole mental system at the primitive level. The instincts in course of experience (as the mind acquires the power of thinking over the objects which it instinctively perceives) integrate themselves into new systems, the sum total of which constitutes the mind at the higher level. The mental system at this stage is a higher unity than the previous one (if a mental hierarchy could be accepted), constituted, as it is, of the various systems of dispositions acquired through thinking and experience. As mental integration proceeds further the acquired dispositions tend to organize themselves into one dominant disposition which represents the hghest level of mental unity in the psychical hierarchy. At this stage all the various sentiments acquired at the second stage fuse into one master-sentiment which McDougall calls the self-regarding sentiment.

These three levels of mental development have been differentiated both on the cognitive as well as on the affective side. On the cognitive side the three stages "may be designated respectively perceptual, ideational, and rational". On the affective side "they are represented by immediate feeling or crude emotion, sentiment, and ideal or principle".[1]

This differentiation into different levels of psychical integration should not lead us to imagine that there are sharp lines distinguishing these stages. It is not true that up to the ability of carrying on a certain mode of experience the mind is at a certain level and then at once changes into the higher one.

[1] DREVER: *An Introduction to the Psychology of Education*, page 62.

The whole growth of the mind is a continuous process, where the stages of evolution are not specifically marked. The distinction of levels is a theoretical one only, expressing differences of degree but not of kind. No stage appears as something new The later stage only emerges and evolves out of the previous one, "The higher level never supersedes the lower which it has grown out of; it merely emerges as an addition to the lower, resting upon the lower, and incapable of existing without it "[1]

Sentiment formation takes place at the ideational and not at the perceptual level. An instinct rises to the level of a sentiment when in the reaction towards an object the object is not merely perceived[2] but intellectually comprehended Ideation is essential before the mental disposition can be said to have reached the level of sentiment Sentiments can be formed only in an animal which is capable of ideal representation. The sentiment, involving as it does the ideational consciousness, can become active and start the conative phase of a response without the perceptual situation which is necessary in the case of the operation of an instinct In man, however as we have said before, an instinctive response may be brought about not only by the object but by its idea as well.

The two essential steps which arise out of the above considerations for the formation of a sentiment around an object are—(1) the intellectual comprehension of the object, and (2) the generation of emotions towards,

[1] DREVER *op cit*, page 62

[2] In perception there is mere apprehension but not comprehension.

and their organization around that object. These go hand in hand. and although intellectual comprehension is a preceding condition for the formation of a sentiment, the comprehension becomes clearer and better defined during the course of the organization of the emotions. For sentiment formation it is not necessary that several emotions should organise themselves round an object. One single emotion generated by a single instinct is quite enough to lead to the formation of a sentiment if it is strongly and repeatedly associated with a certain object. Ordinarily, the sentiments which we have are complex, but we could have a sentiment of the simplest type

The formation of sentiments for concrete objects is a very simple affair. Sentiments for one's home, school or college, books etc., get formed easily as the intellectual comprehension of such objects presents no difficulty. The difficulty is not at all serious even in the case of sentiments for persons. A son knows his father; he spends his time with him. Instinctive love is the starting point of mutual reactions. The son admires the superior powers of his father under the influence of the self-abasing tendency. Gradually a sentiment around the father is formed. The things and qualities of the father create interests in the son and possibly at a later stage the ideals of the father become the ideals of the boy.

When we come to consider the formation of sentiments around abstract ideas and virtues like honesty, truth, justice, etc., the process becomes rather difficult and complex. The intellectual comprehension of these

presents the most serious obstacle Now, so far as the work of the educationist is concerned, he has to engage his attention upon the formation of sentiments for moral traits in children Hence, with whatever means are at his disposal, he has to get over the obstacle and give some intellectual comprehension of these virtues To achieve this purpose, these virtues are linked with actions of which they are the attributes The child is brought into contact with actions which are virtuous. It may be done through lessons in literature or history, or by taking advantage of suitable situations which arise in class and school. The teacher while pointing what is virtuous and what is not, tries to associate these with pleasurable emotions or otherwise, as the case may be He praises honest, true, and just actions whenever an example of these is available, and blames when he gets the contrary Neat and decent work of the children is appreciated while the untidy is deprecated and discouraged The better type of behaviour is even published for mass admiration What happens through all this is, that sentiments are formed about virtuous characters in history or literature, about honest boys in the class, about neat workers in the school, and so on. Gradually as the concepts of abstract ideas are formed the sentiment passes from the honest man to the abstract trait honesty The process is long and tedious. It requires patience and perseverance on the part of the teacher It makes it necessary for him to be watchful about the concrete situations and opportunities which come in his way to facilitate the formation of some of these sentiments. Some situations and opportunities

he utilizes incidentally. Others he has to create deliberately to serve his purpose.

One of the sentiments so much desired and aimed at in schools is the sentiment for patriotism. Both through particular methods adopted in teaching certain parts of the curriculum and through extra-curricular activities the formation of this sentiment has to be brought about. The two steps—intellectual comprehension and the organization of the desirable types of emotions—have to be carried on side by side. It is through Geography lessons that children can be given an idea of the size and extent of their country. The vastness of India can easily be visualized by placing side by side several other important countries of the world on the same scale. The wealth-securing products of the country can be exhibited, and the amounts of products shown by various quantitative and graphical devices. The important places, holiday resorts, places of economic growth, places of natural scenery can be brought before the focus of the boys incidentally in various lessons. Just as the comprehension of the size and wealth of the country is given through certain topics in Geography, in the same way history and literature offer scope for fixing in the minds of the boys what the culture and men of their country have been like, what its men have achieved, and what they are achieving. The history of every country has heroes and heroines, and Indian history is richer than the richest to offer suitable material in the hands of the history teacher. Literature and art acquaint the child with the thought and ideas of life as they have

been evolved in the country. Neither the heroes in history nor the characters in literary stories need be those only who have been connected with the rise and fall of empires and kingdoms, but those as well who as thinkers, scientists, philanthropists, missionaries, social and religious reformers have enhanced the glory of their country.

Assuming that the material available for opening the minds of the children is obtainable and is utilized, the teacher's task in arousing the proper emotions in children is very important. Emotions can be evoked in the child both spontaneously and as a result of deliberate attempt on the part of the teacher. A lesson on the life of a great person stirs admiration in the child if the narration is full of life and vigour. Teachers in achieving this often fall into the error of being flashy, sensational, and too often one-sided with the result that the child finds himself in an unnatural situation to which he has to react With younger children the teacher mostly carries the day, but with senior children who are more critical and balanced the arousal of the proper emotion rarely takes place with sensational procedure They respond as they would in a circus to the various feats before them Now, since a sentiment is to be formed, and since the emotions have to be organized so as to produce a lasting mental system, the child has to be brought face to face only with a situation to which he would freely and naturally respond by expressing the proper emotions. Most of the emotion arousal that is to be done should be spontaneous through the ordinary teaching and

training lessons. It is, however, necessary that some deliberate arousal of emotions should also be attempted by school authorities through patriotic songs, recitations of poems glorifying the saints and heroes of the country, school bands, social service leagues, excursions, rural uplift schemes, and other means and methods which they can think out for themselves.

In general, it is the task of the school to build in the child's mind a system of desirable sentiments. Sentiments for various subjects of study, for the school and its traditions, for cleanliness and tidiness, for truth, beauty, and honesty, etc, are all such which, if formed, will supply an individual with such controls of conduct as would ensure his success in real life

During the course of experience just as both good and bad habits can be formed, in the same way sentiments both of a desirable as well as of an undesirable nature can be developed Sentiments being acquired dispositions may become formed even for some of the vices, if the primitive tendencies are allowed free play in channels which are unsocial. And such sentiments can be more easily formed than the better type ones The school, therefore, while affording all opportunities for the free expression of the tendencies of the child has to provide an environment where sentiments of an undesirable type may not be formed. Again, to build up sentiments of love for virtues should be regarded as a better method of training than building up sentiments of hatred for vices.

An individual's character has been considered as formed of his habits While not arguing anything

seriously against such a view (before we have considered the psychological nature of habits) it is worthwhile pressing a little the distinction between habits and sentiments. Habits aim at a mechanical repetition of a certain type of reaction which has been practised They are stereotyped and operate generally in a limited sphere and with change of circumstances often fail to yield the type of reaction expected Sentiments involve a certain standard of ideation, both in their formation and in determining the response based on them. In habits it is not necessary that the emotions shall have been organized and knit together so as to yield an enduring mental disposition In sentiments the organization of emotions into a stable system is an essential condition "A sentiment is more adaptable and more reliable. A child may form a habit of doing sums tidily, but be extremely untidy at home or in other work; a real love of, or sentiment for, tidiness will show itself in all branches of life "[1]

Self-regarding Sentiment

Each sentiment, referring as it does to a certain object, or person, or idea controls the conduct of the individual in so far as his reactions towards that particular object, or person, or idea are concerned In psychical integration all the sentiments have to organize themselves in such a way that the whole acquired mental structure organize itself into an ideal which

[1] Sturt and Oakden *Modern Psychology and Education* page 115

governs and controls actions in all directions. Such an organization is reached when the master-sentiment which includes within it all the subsidiary ones is formed. McDougall calls this the self-regarding sentiment. Just as all the other sentiments are formed around one object or another, this sentiment forms around the object or concept 'self'. Since all objects in which an individual is interested have a reference to the individual self, naturally sentiments for all objects referring to 'self' converge to this master sentiment around 'self'. It is this sentiment for self-regard that decides mental conflicts and saves the moral ship from striking against rocks and being shattered.

How is this sentiment formed? The process is the same as in the case of any other minor sentiment, except that it is slow and prolonged, and necessitates the presence of a proper environment during the whole period of an individual's emotional development. The individual has to be made to comprehend 'self' as a separate object and as one worthy of regard before any sentiment about it can be formed. The rise of self-consciousness, on the basis of which the regard for self is developed, proceeds from a fairly early period of life. and continues during the whole period of development.

The arousal of self-consciousness is a social process, and the formation of a regard for it definitely depends upon social interaction. An individual becomes capable of good or bad conduct only as a social being He is never born so. All moral or immoral conduct is evolved through social interaction. McDougall insists on our regarding "Moral conduct

as essentially social conduct".[1] No moral conduct can come about without some form of self-consciousness, however crude it may be, and since that consciousness is aroused in society, it is society which generates moral or immoral conduct in the individual. The teachers, and the parents, operating and manipulating the environments at school and at home respectively have the sole responsibility for what the moral nature of a child is to be

How does self-consciousness arise during the course of social interaction? To start with, through his reactions a child learns to distinguish himself from his surroundings. He becomes conscious of the fact that his individual self is distinct from other animate as well as inanimate objects. In these earlier stages the distinction is clearly a physical one He becomes conscious of his body as being separate from others. Through various experiences of pain, pleasure, growth, movement, etc., the distinction between living and non-living objects, and the 'self' as belonging to the former becomes clear. As a living being he realizes that he is capable of manipulating the environment and in turn being manipulated by it. He thus finds that he is a doer as well as one done to.

The subjective and the objective distinction arises slowly. He observes the reactions, conduct, and behaviour of others, and becomes conscious of the fact that he can discriminate between the actions of various individuals. He realizes that he (whatever he be) is

[1] McDOUGALL: *An Introduction to Social Psychology*, page 150.

capable of thinking over the behaviour of others. But at the same time he finds in the course of his reactions with others in his environment, that just as he can criticize and judge the actions of other individuals, his own in turn are and can be similarly commented upon by others. He is thus made conscious of the fact that he is as much an object of observation and consideration as any other about whom he thinks and judges. The self-consciousness thus becomes clear in both the directions—the 'self' as a thinking agent, and the 'self' as an object of thought.

James draws this distinction between the two phases of self—the self as knower, and the self as known. "The self as known, or the 'Me', the empirical ego, and the self as knower, or the 'I', the pure ego."[1] He divides 'Me' into—(*a*) its constituents—the material me, the social me, and the spiritual me, (*b*) the feelings and emotions which they arouse, and (*c*) the acts to which they prompt. The presentation of 'Me' in any phase arouses 'self-knowledge and self-reverence' and leads to 'self-control' on the dynamic side.

The consciousness of 'Me' in any individual is distinctly a social process, depending throughout upon the various complex reactions between himself and the various other individuals around him. Each individual with whom he comes in contact carries as it were an image of him in his mind. He cares for the opinions of some and not of the others, and the conception of

[1] JAMES: *Psychology—Briefer Course,* page 176

'Me' that gets fixed in his mind and which he decides to maintain, is the conception which is the sum total of the images in the minds of those whose opinions he cares for. Whether this sum total of self images is of the right type or not, will depend on what images, those whose opinions he values, have built for him · a matter which puts grave responsibilities on the educators, parents and superiors in general

Side by side with the arousal of self-consciousness develops the self-regarding sentiment 'Self' is an object worthy of thought, and 'self' is a thinking, judging agent itself. The latter, *i e*, the 'I' begins to think and ponder over the actions of the former, *i e.*, the 'Me'. Just as in the formation of a sentiment around any object, the various emotions organize themselves around it, in the same way the emotions get organized around the 'Me' The 'Me' comes in social contact with the other individuals, who approve or disapprove of his actions and shower praise or blame as the case may be The feeling of this praise or blame influences 'I' as regards the opinion of 'Me' Every emotion that the 'Me' expresses in any situation, is critically examined by the 'I', and the 'I' begins to accept or reject (as the case may be) the idea of 'Me' as capable of experiencing the particular emotion The 'Me' becomes angry at someone in a certain situation, the 'I' judges whether the anger is justified or not, and decides whether the self should or should not be associated with the emotion of anger in that particular situation, should it have to be faced in future again. In practice there is rarely an occasion when the think-

ing self is under the influence of a single emotion. On almost all occasions the mental state is a complex one where several emotions express themselves simultaneously.

The praise and blame administered by others on the actions of an individual gradually make him capable of judging his own actions himself in terms of the social code. He accepts to do a certain action because he regards it as worthy of himself, or rejects it because it is unworthy of the same. This worthiness to the self, as we have said before, arises out of what the others have impressed about the 'self' on the individual's mind. The individual gradually casts out an ideal in terms of which the actions are judged. Since in this ideal the worthiness of the self is involved, the idea of self as it has come to be developed as a result of social interaction, is the ideal of the self. Actions take their guide from this and are judged in terms of this. When this stage is reached a sentiment for 'self' must be regarded as having been formed.

The formation of the idea of self as a standard of conduct or ideal is a very important matter for the consideration of the teacher. This idea of self is a result of social interaction, primarily a result of what the teacher, or the parents, or those with whom the child has lived have formed for him. What the child regards himself is, really speaking, what he has been made to regard himself. His action will be according to that standard of conduct, which others have been able to impress upon him as being worthy of himself. A child who has been made to believe he

is honest and good, will tend to make his conduct worthy in terms of that self-ideal. Another on whom it has been impressed that he is unworthy and untruthful will tend to conduct himself so as to be in keeping with that self-standard. In moral training the habit of constant nagging on the part of the teacher or the parent can never be regarded as a justifiable procedure, as more often than not it develops an undesirable conception of self-ideal in the mind of the child. There is fear of his becoming as irreparable as perhaps a criminal after serving a long term of imprisonment and having a confirmed notion that his 'self' is a scoundrel. Nothing serves better as a method of reformation in the Colonies and Reformatory schools than an attempt to re-establish the lost self-respect of the child.

Volition

With the formation of sentiments and the consequent establishment of ideals for conduct, the individual tends to direct his actions in such a way as to realize in actual action the ideals which have been formed. In some individuals (though rarely) the realization of an ideal does not present a very serious problem. In them, the motive (as regulated by the presence of the ideal) acquires such strength over the cruder wishes and desires. that the ideal regulates their conduct in an unfailing way. Such individuals can and do realize their ideals In other individuals (more

common than the former) although the ideal is acquired all right, yet it does not gather sufficient force as automatically to regulate the conduct according to its promptings. An attempt has to be made to reinforce the motive behind the ideal to overcome the coarser wishes and desires prompted by the primitive controls of conduct. The distinction that we have drawn between the two types of individuals is strictly speaking, a difference of degree and not of kind, the difference being indicated by the amount of reinforcement needed to realize the ideal in action. In all moral actions, such as we desire to be performed by a man of character, the reinforcement is a special feature This reinforcement may be called volition or will-power

Will-power has been interpreted in two distinctly separate senses, and we should be clear as to the sense in which we accept the usage here.

(1) Will-power is regarded as an individual's capacity to be able to carry on a voluntary mental activity for a considerably long time. In this sense one who can maintain continuity of attention to the work in hand possesses greater will-power than another who gets beaten. To adopt Woodburne's illuminating phrase, will is nothing but 'stick-to-it-iveness.'[1] A boy with greater will-power can carry on an intellectual task for hours together keeping concentrated upon it. Whenever the attention fags the will reinforces it and he gets to it again.

[1] WOODBURNE. *Human Nature and Education*, page 215

Such a power, whether it be designed will or not, depends on certain factors Firstly, it depends on age. The older the child the longer can he maintain this sort of voluntary attention to the activity. An adult can concentrate for a longer period than a child. It may, however, be argued that even this sort of concentration depends on the formation of interests and sentiments rather than on anything else. Secondly, it depends upon the physical condition of the individual. With the onset of fatigue or during any physical ailment the activity cannot be sustained long Thirdly, the factor of training and practice influences the prolonged continuity of the action Day in and day out practice at a dull, difficult, monotonous job lessens the strain The mental system, as it were, gets used to it and the voluntary effort to sustain the activity is minimized. The grind which couldn't be carried on for two hours is kept going for four or six.

In the old system of pedagogy, development of will through various courses of study meant mental development in this direction. Will was assumed to be an innate faculty which by exercise through certain types of central exercises was strengthened. The more uninteresting and dull the task the greater was the chance of will development. Long and tedious written exercises, memorization of ununderstood verses, grammar rules, mathematical formulæ, and all the rest were considered highly useful exercises Now, while not altogether deprecating the necessity for training children to be able to carry on useful work for prolonged periods (as much as is in keeping with their age and

physical condition), such a conception has altogether been discarded. Will is not a native faculty, a mystic power which universally operates. It is a result of training and growth. "The will is character in action."[1] It is not an isolated mental force. We have all the while emphasized the essential unity of mind, and hence its dynamism, however specialized, is controlled by the mind as a whole. The character in action, as we shall presently discuss, necessitates the whole mind at work. Angell has very significantly remarked "The whole mind active, this is the will."[2]

(2) Will according to modern psychologists, is to be regarded as the deliberate "action in the line of the greatest resistance".[3] Will is the reinforcing agency which comes on the scene of action in case of a mental conflict to decide the choice of action. The crude instinctive tendencies tend to direct a man's action into a channel which may be termed the path of least resistance. The acquired mental disposition which tends to regulate the higher type of conduct—a conduct which points in the direction of greater resistance—standing by itself seems unable to overcome the force of crude dispositions, and the will comes to the rescue supplying the amount of mental energy needed to direct the action into the channel of the greatest resistance. James while defining moral action as the

[1] McDougall: *An Outline of Psychology*, page 442
[2] Angell: *Psychology*, page 437.
[3] James: *Principles of Psychology*, Vol II, page 549.

"action in the line of the greatest resistance" represents the situation in case of a mental conflict by a mathematical statement as is given below:—

I (the ideal impulse) standing by itself
$<$P (the native propensity)
but I+(Effort of will)$>$P

In the case of a type of behaviour guided and controlled by primitive tendencies there is immediate pleasure forthcoming, and so the individual tends to go in that direction. But in the case of a moral action the pleasure is removed far away from the activity (more often there is a definite unpleasure intervening), hence the path surely becomes that of the greater resistance. Some mental force, whatever its nature may be, is undoubtedly needed to supplement it in order that the choice may be made in the latter direction. Will is said to supply this extra dynamic power.

What is its nature? Whence does this extra force come? The indeterminists have failed to carry their analysis of will beyond noticing its effects, and thus leaving it as an unknown quantity. The libertarians, believing in the complete freedom of the will, regarded it as a mysterious power endowed to man's mind which was free to operate in any way it chose. Modern psychologists are not inclined to accept any such position and have attempted to give an interpretation to the phenomenon of volition, and locate the source of this reinforcement in mental dispositions which have been acquired and organized

The behaviouristic interpretation which regards mental activity as mechanical activity need not detain

us, for, according to it 'will' will have to be looked upon as an extra faculty coming in at certain crucial moments like extra energy introduced into a machine. What is held by the orthodox psychologists is, that the additional mental energy needed for the exercise of the 'will' arises out of the organism's mental structure. When the impulse behind the highest organized mental structure is converted into the dynamic form we have the will. The highest organized mental structure is the ideal of 'self' which the individual has acquired by an integration of the various sentiments developed in him. Drever calls the 'will' the "organized Self in its dynamic aspect" [1]

McDougall has fully explored the nature of this organized Self, and what force it is capable of lending to the weaker impulse in the time of mental conflict While we see the discharge of the impulse in special cases of mental conflict, the functioning of the will-power should not be identified with any momentary experience. It is in general the whole Self active in the task of life. All impulses and desires in a man, desirable or undesirable, simple or complex, arise out of his mental structure which is made up of his innate and acquired dispositions. In any of his conations, it is these that must be excited We have simple as well as complex conations, and psychologically we have no choice but to accept the view that volition is nothing but a case of complex conation. We cannot regard it as arising out of some mysterious power,

[1] DREVER: *op cit*, page 136

as some striving whose nature is unknown, or at any rate, different from that of other conations in general

What McDougall would accept is that 'will', while not differing in kind from any of the other conations is a particular kind of the same This particularity is of course marked and is the point of differentiation. He does not accept Schopenhauer's extreme view that "every form of mental activity issues from the will." Mental activities do admit of a differentiation into simple and complex conations which McDougall calls "volitional and non-volitional conations" In order to differentiate a volitional from a non-volitional conation or simple desire he accepts Stout's view that. "a volition is a desire qualified and defined by the judgment that, so far as in us lies, we shall bring about the attainment of the desired end" [1] He, however, contends that mere judgment has not sufficient motive power to reinforce the weaker motive The real characteristic which marks the volitional act, in the sense that it lends sufficient energy to the weaker impulse, is 'that the personality as a whole, or the central feature or nucleus of the personality, the man himself," the 'I' and the 'Me' combined "is thrown upon the side of the weaker motive"

Now this 'I' and 'Me,' or the total self cannot in every case play this important role of siding with the weaker motive It can do so only if the acquired mental structure has reached that stage of integration which is the characteristic of the self-regarding

[1] *Mind* N S, Volume IV

sentiment. The 'I' and the 'Me' enter the field only by virtue of the sentiment for their own selves. If that sentiment for self-regard has not been formed, the self will not rise to the level of the occasion. "The conations, the desires and aversions, arising within this self-regarding sentiment are the motive forces which, adding themselves to the weaker ideal motive in the case of moral effort, enable it to win the mastery over some stronger, coarser desire of our primitive animal nature."[1] And hence volition is nothing but "the supporting or re-inforcing of a desire or conation by the cooperation of an impulse excited within the system of the self-regarding sentiment"[2]

Dewey, while discussing the freedom of the will has analyzed three main elements in it—"(1) the ability to carry our plans to fruition without the cramping and thwarting of obstructions; (2) the capacity to vary our courses of action, and to experience change and novelty; and (3) the capacity to desire and to choose between alternatives".[3] We have already rejected the innateness of this freedom. The capacity of choice-making and the ability of discharging the necessary impulse to carry through the choice made, are both acquired.

The education of the will really amounts to the helping of the growth of the self-regarding sentiment in the individual child Individual children differ, and this differentiation may be expressed by adopting James's terms—'the explosive' and the

[1] McDougall *op cit*, page 213

[2] *Ibid*, page 214

[3] Dewey: *Human Nature and Conduct*, page 303

'obstructed' will. Precipitate action which is a characteristic of the explosive will shows either feeblemindedness or insufficient emotional development In other words, it indicates that so far as a normal mind is concerned, the self-regarding sentiment has not been formed Sluggish action which is the characteristic of the obstructed-willed individual indicates that the emotions are unable to lend the impulse necessary for action. In other words, they have not been well organized so as to become the motives of actions. Here again the self has not reached the proper organization to play the dynamic role.

Character

There is no system of education that does not aim at developing character in the youth. What, psychologically, is the nature of this character? Character is that mental factor in an individual which determines his social behaviour. It is a mental organization which lies at the back of all his conations His early conations are controlled by primitive mental dispositions. But the possession of these alone does not make us regard an individual as possessing character So when we refer to the conations which are controlled by character, we definitely mean those which refer to an individual's moral and social conduct, such as is befitting the members of human society.

As we mentioned before various levels[1] of human behaviour have been recognized And these from the

[1] See Chapter V, page 127

bottom right up to the top are continuous, representing as they do the extent of evolution on the upward scale Evolution assumes some other basic considerations. Firstly, the higher levels arise out of the lower ones, they never enter the ladder of growth suddenly Secondly, while the higher levels supersede the lower ones in the matter of control of conduct, the latter are never altogether wiped out They have a tendency to prove their defectiveness when the higher control weakens because of certain mental and physical conditions Regression to the lower levels of conduct, while not commonly occurring in men situated at the high level of mental evolution, is not altogether ruled out as being out of the bounds of possibility.

While Drever has emphasized three[1] levels of mental development on the affective side (crude emotion, sentiment, and ideal), McDougall has differentiated four levels of conduct which represent the various stages of development "(1) The stage of instinctive behaviour modified by the influence of the pains and pleasures.... .; (2) the stage in which the operation of the instinctive impulses is modified by the influence of rewards and punishments administered... . by the social environment; (3) the stage in which conduct is controlled......by the anticipation of social praise and blame, and (4) the highest stage in which conduct is regulated by an ideal of conduct .... that seems right regardless of the praise or blame."[2]

[1] See page 164-5

[2] McDOUGALL: *op cit*, page 156

So far as the lowest and highest stages are concerned there is no difference between the two thinkers. As regards the middle stage which is to be traversed to reach the highest, McDougall is inclined to sub-divide the stage of 'sentiment control' into two sub-stages. He differentiates between sentiments of different orders. His second level corresponds to cognitive systems which consist of sentiments for concrete objects, and the third level to those systems which consist of sentiments for abstract virtues. No fundamental difference is thus introduced into the division of levels or stages.

In tracing the development of the structure of character of a hypothetical individual John Doe,[1] he shows the differentiation of the second and third levels by referring respectively to the conduct controlled by such sentiments as for house, mother, children, wife etc., (at the second level), and for justice, generosity, strength etc., (at the third level). While in general the growth of sentiment does follow such a ladder, we must emphasize that the growth of the two types is not separated by a marked period in mental genealogy. While the sentiments are being formed in the growing child for various concrete objects, the sentiments for virtues are also in the process of formation bcause of the concrete social situations in which the moral virtues are brought into application. In so far as McDougall differentiates the types of actions (reference being to the motivation) and classifies them, there can be no contention.

[1] McDougall: op cit, page 441.

We have called character an organized mental structure. It is that which constitutes the personality, and constantly arouses the right type of response. It is obviously the outcome of native tendencies plus the development which they attain—a development in which they seem to lose their pure identity altogether. Character is thus the sum total of acquired dispositions, a mental structure which is lasting, enduring, and ever influencing conduct. It is definitely a product of social interaction. Good character is made and does not innately exist

Some thinkers have regarded character as a bundle of habits. Such a conception from the popular point of view would seem complete. A man acts and behaves according to the kind of habits he has formed, and a sum total of these should give us an idea of his character. But we have distinguished between habits and sentiments and shown the mechanical nature of the former in operating in fixed situations. Habits cannot be regarded as modes of conduct depending on settled and well-formed mental dispositions, which will provide the organism with sufficient mental energy when a need for volition arises. Habits fail whereas sentiments do not A man's behaviour cannot be predicted in terms of his habits, but it is largely and pretty definitely predictable in terms of his sentiments. According to Shand, an individual's behaviour should be predictable by his character. If the character is known then the individual becomes a known quality. A sure prediction is not possible unless we regard character as being constituted of

the more enduring mental dispositions which are sentiments.

If we are to define character in terms of habits we have to understand habit widely, as something which includes,—(*a*) disposition, (*b*) habit (in the narrow sense), and (*c*) the general mental attitude or temperament We shall also have to assume that an individual's habits do not operate absolutely separately but are capable of being integrated and organized into one enduring system. Having definitely understood the nature of sentiments and their organization, we shall regard character as the mental structure obtained by the highest integration of sentiments into the self-regarding sentiment In an individual's sum total of character we do however include, besides this acquired mental structure, the individual's general mental attitude or temperament which is more or less a hereditary endowment.

In order that the process of mental integration may be facilitated in the educands, an educator should take note of some of the laws of mental development which have been differentiated by various psychologists. Drever has enunciated seven such laws based on the views of James, McDougall, and Shand, and we can do no better than follow Drever's summarization[1]—

(1) The law of development by stimulation—"The more frequently a natural tendency is evoked, other circumstances remaining unchanged, the more readily can it be evoked, and the more powerfully does it

[1] Drever: *op cit*, page. 65-74

operate." Various traits of character, good as well as bad, *e.g.*, boldness and timidity, can be developed by the stimulation of anger, fear, etc., in desirable or undesirable types of situations.

(2) The law of selection by experienced results—"Those actions tend to be discontinued which lead to unsatisfactory or disagreeable results: while, on the other hand, successful reactions, or those which involve agreeable results, are established." This law is based on the fact that the organism tends in general to seek pleasure and avoid unpleasure. Tendencies giving rise to unpleasure naturally tend to be repressed and inhibited.

(3) This is what James has called the 'law of inhibition by habit'—"When objects of a certain class elicit from an animal a certain sort of reaction, it often happens that the animal becomes partial to the first specimen of the class on which it has reacted, and will not afterwards react on any other specimen." The object which first elicits the response acquires a special meaning to the organism as compared to others if they happen to arouse affective experiences. Under such circumstances the organism becomes partial to it. It *may not be wrong to say that it tends to form a sentiment* around it in preference to other objects of the same class.

(4) This is again James's 'law of transitoriness'—"Many instincts ripen at a certain age and then fade away." We have discussed this fully in a foregoing chapter.[1]

[1] See Chapter IV, pages 88 90

(5) This is the law of 'transference of impulse,' after McDougall—"Under certain more or less definite conditions, and as a result of experience and circumstances, an instinctive impulse may come to be evoked in connection with objects or situations different from, and sometimes entirely unconnected with, those which originally evoke it." Such transference leads to the sublimation of the tendencies, a phenomenon which we have discussed before, and in which the energy of the primitive impulses is drained off into useful channels. Transference of this kind is very large in human beings. One of the cases of transference according to Drever is, when the "transference of interest from an end to the means for attaining that end" takes place This phenomenon occurs, strictly speaking, at a fairly high level of mental development But in a sense, according to some psychologists like Thorndike, it characterizes the learning processes of animals as well

(6) This is the law of 'the fusion of feeling or emotion'—"Primary emotions, simultaneously evoked, fuse so as to produce an emotional experience, different from the emotions involved, and *suo genere,* but generally analyzable into its elementary components" According to this law, complex emotions are evoked as a result of fusion of simpler ones, and thus an individual's emotional state tends to be more and more complex as time passes.

(7) This is called the 'law of complication of behaviour'—"Where different impulses are evoked by the same situation simultaneously, and different emotions fuse in the resulting emotional experience, the

behaviour will tend to be always a complication of the behaviours corresponding to the respective impulses and simple emotions involved, with a varying emphasis according to circumstances." This law refers to the increasing complexity of human behaviour in view of the arousal of several emotions together and their fusion.

While discussing the important constituents of character we referred to the presence of a factor 'temperament'. This phase of one's character is regarded as a hereditary endowment. Temperament, according to Shand, is the innate character—that part of the innate constitution of the mind which is different in different men, and which refers to their feelings. He differentiates between temper and temperament, the former being the mode in which a man feels some particular emotion and behaves under it, and the latter as the sum-total of the innate tempers of his different emotions. Temperament thus refers to one's general emotional nature.

It is said that temperament, although it is a mental quality, has a definite physical basis. McDougall defines the temperament of an individual "as the sum of the effects upon his mental life of the metabolic or chemical changes that are constantly going on in all the tissues of his body."[1] The old philosophers distinguished four temperamental types, the 'bilious' opposed by the 'sanguine,' and the 'nervous' opposed by the 'phelgmatic.' While such a classification may not be quite justified, the physical basis in it is clearly marked.

[1] McDougall *An Outline of Psychology*, page 354

The physical and chemical changes which go on in the liver, the digestive system, and various glands[1] in the body, influence in turn the nervous system. Some influence all parts of the nervous system, others are selective and influence only special parts. The influence in the nervous system is transmitted to the mental activities which the individual carries on The working of the physical system, including the nervous, is determined more or less by the mechanism of heredity[2], and hence bodily states as endowed by heredity bring to bear their influence on an individual's mental process, thus marking him out from others. But the temperament depending on bodily states, determining as it does to a certain extent the general efficiency of the personality, does not constitute the moral nature of the individual. The latter is a result only of acquired mental development. The ideals determine the character, and these are acquired

Complexes

A discussion on character cannot be regarded as complete without the treatment of certain emotional memories or complexes which constitute a part of an

[1] Excessive secretions from certain glands, e g, the thyroid gland secreting the hormone, accelerate the working of the nervous system and make the individual highly excitable Deficiency in secretions from thyroid gland makes the individual 'sluggish and unduly calm'. The cause of the slow growth of some torpid children is nothing but this, and they are therefore given doses of hormone derived from the thyroid glands of sheep and monkeys along with their food so that they may get over their cretinousness

[2] While bodily states are endowed by heredity it cannot be denied that to a certain degree they are modifiable by such artificial influences as diet, physical exercises, etc

individual's total mental structure. The character of an individual cannot be regarded as having been well formed if he retains some of these complexes. Complexes are the results of mental disorder, and so a mind in which the integration has not proceeded smoothly cannot be regarded as having been sufficiently well organized so as to be a sure and satisfactory guide in controlling behaviour.

We have discussed certain lines according to which specific sentiments are formed out of the crude mental dispositions, and how these sentiments organize themselves into the self-regarding sentiment which lies at the basis of our character. In an ideal environment which provides the most suitable scope for mental integration, such a development as we have pictured will normally take place. But this development does not necessarily proceed on normal lines all the while There are derangements and disorders, differing in the case of different individuals, in so far as their emotional tendencies find proper expression or not The environment is so complex, and there are circumstances which so often exert their influence—an unsympathetic teacher or parent, a step-mother, a nagging elder or a companion, poor home conditions, etc, to quote a few obstructions. These impede the mental development and organization from proceeding on right lines

Various attempts have been made to understand the nature of these disorders, and the discussions of Freud, Jung, and other psycho-analysts must be regarded as throwing a good deal of light in this interesting field No detailed treatment of this school

of thought is possible in a short space, and we shall therefore only summarise some of the important ideas and conclusions leaving the interested student to read the original works of some of these thinkers

The old psychologists who regarded psychology as the study of consciousness restricted themselves to the study of mind as expressed through conscious states. Now, a mental experience is not all that is revealed by the conscious state only The other parts of mental structure which do not constitute the conscious state, or rather which are not revealed by the study of the conscious state, also play an important role in determining the mental experience or behaviour. These may be termed the unconscious According to Freud, who claims the psychology of unconscious as the new psychology, consciousness is merely the surface of mental life The real working of the mind is determined by what lies deep-hidden in the unconscious regions It is that which cannot be disclosed through a simple process of introspection of the mental state The introspection merely gives an account of the conscious phase of the process

It is difficult to say that the psychology of the unconscious is a discovery of the psycho-analysts headed by Freud The history of psychology reveals that the unconscious in some form or another was studied as far back as the time of Leibnitz. Leibnitz (1646—1716) recognized certain stages of clearness so far as perceptions were concerned—(1) obscure perception, (2) confused perception, and (3) clear perception The 'obscure perception' of Leibnitz

represents, in the simple form, the unconscious. Leibnitz emphasized the place of these obscure perceptions in the mental life of an individual. According to him a man's genius, his sleep, dreams, and in fact his whole individuality were all determined by these. The unconscious presentations, which although they slumbered in the obscure form, did influence mental reflection. The later influence on the psychology of unconscious was the doctrine of unconscious enunciated by Von Hartmann (1842—1906). According to him the unconscious clearly influenced the conscious. The conscious willing, in both types of act, instinctive as well as higher, was conditioned by an unconscious purpose or idea

The present study of the unconscious has arisen out of the study of the abnormal mind. Some psycho-pathologists and psychologists like Janet, Ribot, and Morton Prince have interested themselves in the study of the 'dissociation of the personality'; others like Carpenter interested in the physiological aspect of the question have investigated the 'unconscious cerebration' rather than the 'unconscious mind.' Freud's particular interest has been in the study of the morbid states of mind, specially as expressed in dreams and the dynamism of sex. He has psycho-analysed errors of speech and action and dreams, and he believes that through a process of analysis perfect determinism of the psychical is possible.

His analysis and conclusions are no mean contribution to modern psychology. Certain problems of the working of the hidden mind have been tackled by

him in an extremely fascinating way, but the young teacher, with scanty knowledge of the technique, need not attempt to adopt any method of psycho-analysis with his children. It is not any and every child that is abnormal, nor does a casual observation of the case help the teacher very much Only a thorough clinical study of the mental complexity of the particular case can reveal truths and supply data for modification of methods for him A general survey, however, of the unconscious aspect of the normal mind is being attempted here

A man's behaviour is determined by his composite mental structure [1] Part of it is revealed by introspection, but another part of it (which according to Freud is the major and chief portion) is not revealed by it although it influences the behaviour. Mental structure consists of the conserved elements both hereditary and acquired (the acquired ones may or may not all be well-organized). These conserved elements perform two functions Firstly, they determine behaviour and experience which is conscious; secondly, because of certain circumstances which obstruct proper reactions in the environment, they go on combining and recombining all the time within the mind forming disorganized groups, of which we are quite unaware The process of combination or compounding is endo-psychic.

The formation of these unconscious structures would not be possible, at any rate would be quite controlled, should the integration of engram-complexes

[1] There is some confusion in Freud's theory as regards mental structure and function The unconscious must be regarded as belonging to mental structure. Consciousness, on the other hand, is a mental function.

take place in the well-organized manner in which we have assumed it to take place in the formation of the various sentiments and the self-regarding sentiment. But the ideal never being achieved some endo-psychic processes do go on in the mind of each one of us, preparing disorganized structures of which we are unaware until we see their influence on our behaviour. The more does this endo-psychic disorganization take place the more morbid and abnormal a mind is produced. These mental structures which are a result of the warring of instincts, or of instincts and sentiments, or of sentiments among themselves when they are of an opposite nature, are called complexes. They are quite as strong emotional systems as the sentiments, but as Pear has pointed out they are 'untidy systems' while the sentiments are 'tidy ones'. According to Burt, "the one (sentiment) is organized mainly by logical relations; the other (complex) by accidental associations, and therefore hardly organized at all. The one is known and acknowledged by the possessor; of the other the possessor is almost wholly ignorant, automatically keeping it shut off from all attention, memory, or awareness".[1]

But while the possessor is unaware of them they do determine his behaviour, and so often bring about a great mental conflict when a behaviour is to be determined. This conflict, although it pertains to the unconscious, is no less straining than the conscious mental conflict found in an act of will or volition. There is drain of mental energy. And more often than not

[1] BURT—*The Young Delinquent*, page 547.

there is the possibility of the behaviour regressing[1] towards unsocial conduct under the influence of these untidy systems It is the task of education to see that the formation of these systems is not allowed to take place, at any rate is minimized

The possessor of complexes is unaware of their presence. He and those who come in contact with him only notice the abnormal behaviour exhibited, not knowing what its cause exactly is Now, it is the claim of Freud through the technique of psycho-analysis, which consists mainly of dream analysis and word-association responses, to determine these hidden complexes and reveal them to the possessor Their origin, according to psycho-analysts, is due to repressed wishes, particularly those pertaining to sex. A tendency not finding its expression, if repressed is still an active part of the mind—a source of psychic energy which carries on endo-psychic processes and produces these disorganized, untidy mental systems which we have termed complexes A tendency or wish not finding admittance to the consciousness does lie in waiting, and passing the threshold has its full play as in the case of dreams According to Freud, there is a censor at the door of the chamber of consciousness who checks and halts the mental excitations During sleep or during mental disease the control of the censor is lost or diminished like the half-awake 'chowkidar,' and

[1] Under the influence of complex any of the two well known directions may be taken—(1) Flight from reality (according to Jung), or (2) adoption of defence mechanisms (according to Adler) It is just possible that we may have a phenomenon in which both these modes of reaction may be involved

the mental excitation expresses itself The dream analysis reveals the nature of the unconscious, and gives an idea of the hidden regions of the mind.

Complexes, when formed, lead astray the behaviour of an individual. There are several types of complexes formed in children. Burt has taken particular note of 'the step-mother complex,' and 'the authority and disgust complexes,' to which may be added 'the inferiority complex.' These and others if not controlled lead to delinquency slowly and gradually. They are results of mental conflicts in certain situations. Children's complexes in most of the stages of their formation, when discovered, can be controlled by sympathetic means, and a proper direction of repressions can bring about the sublimation of desires. thus changing the character in general.

The formation of a strong sentiment for self, which establishes the self on a high pedestal, which endows an ideal not easily to be broken, is a definite source of strength in fighting all mental conflicts. During adolescence there is greater mental conflict than ever in the whole period of life. And, if slowly and gradually the sentiment of self-regard has been taking root, the difficulty of adjusting himself to the environment, which the adolescent generally finds, is tided over. The problem of adolescence merits a fuller discussion, as on the training of the adolescent hinges the growth and cohesion of society. We shall therefore treat the problem again later.

References for further reading

1 SHAND : *The Foundations of Character*, Book I.
2 DEWEY : *Human Nature and Conduct.*
3 DREVER : *An Introduction to the Psychology of Education*, Chapter VII.
4 BARBARA LOW · *The Unconscious in Action.*
5 JAMES : *Principles of Psychology*, Vol. II.
6 McDOUGALL : *An Outline of Psychology*, Chapter XVII.
An Introduction to Social Psychology, Chapters VII and IX.

CHAPTER VII

SENSATION AND PERCEPTION.

WE have so far discussed the affective side of the mind, and how its development takes place We shall now turn to the working of the cognitive side. While we differentiate the working of the mind in these separate phases we wish at the same time to emphasize the implicit and inclusive nature of every mental experience. The essential unity of mind is the primary hypothesis. No experience, however coldly cognitive, can be said to be entirely free from the touch of affect. And affect, of course, is not possible without cognition So far as mental development is concerned, while we hold that it is possible that an individual may be more highly developed on one side as compared to another, we cannot accept the position that the two are entirely disconnected. Expression in one direction influences to a certain extent development in the other. Teachers who keep the two phases rigorously separate have failed to grasp the essentials of a mental experience. To take an example: an intellectual process like reading aloud is considerably influenced by the emotional attitudes of a child, and a correction on the intellectual side alone does not frequently improve matters.

The most elementary process which is essential for cognition is sensation For the most meagre apprehension of anything in one's surroundings there must be the sensing of it. In fact, sensation is such an elementary process that a phenomenon representing pure sensation exists merely in imagination We really have a sense-perception, the nature of which we shall presently examine

Sensation

Education aims at helping us to profit by our past experiences, so that we may be able to adjust properly our reactions to our environment But it does presume the fact, that we are capable of reacting to the stimuli which we receive from the environment in which we live We must possess the means to react Assuming the existence of a life process in us, which directs our reactions, we must have suitable apparatus for being able to react: whether rightly or wrongly is another question. We have, therefore, been endowed with certain sense-organs, and we have different types of sensations corresponding to each

Scientists have differentiated five types of sensations corresponding to the five sense-organs—seeing (visual). hearing (auditory), smelling (olfactory), touching, and tasting While psychologists accept these they assert that man has been endowed with powers of sensory discrimination in other directions as well They regard kinæsthetic sensations as of primary type. These kinæsthetic sensations have to do with

position and movement. We sense correctly the position which our body assumes, and also the movements we make in our various reactions to the stimuli offered by our environment. Again, touch sensations have been further classified into three separate types—those of heat, cold, and pressure. Our internal organs also possess sensory apparatus with the help of which they adequately deal with the stimuli offered to them.

Different individuals differ as to their acuity in any direction. It is not difficult to notice that the visual acuity of one individual is keener and more refined than that of another. Differences can be noticed so far as all types of sensory acuities are concerned. Acuity does not depend upon training but is a gift of heredity. Experiments[1] can be performed with the help of which the sensory acuity of an individual in any direction can be determined; also the acuity of two individuals can be compared. To take the case of visual acuity, it is measured by the angle subtended at the eye by two points which can just be distinguished as located separately. The better the visual acuity the smaller is the magnitude of this angle. The letter types or dots, etc., which are generally used in this experiment are to be placed at a certain standard distance obtained by experimenting on a large number of persons having normal vision. Auditory acuity, in a crude way, is measured by means

[1] For any accurate experiments, with the necessary precautions, that a student may desire to perform, he is referred to the Experimental psychology books by Myers or Titchener or Woodworth. The experiments mentioned here are rather crude.

of a watch which is gradually moved away from the subject until that distance is reached when the ticks are just inaudible.

WEBER-FECHNER LAW

The extent to which any individual can respond to a stimulus with his particular sense-organ depends on the acuity in that particular direction In order that he may be able to distinguish beween two stimuli (whether sounds, or weights, or lights) they must differ at least by a certain minimum amount This minimum amount, which is necessary for making the subject aware of the difference, is called the 'differential threshold' of the particular kind of stimulus. The differential threshold differs for different sensations. "For lifted weights it is about one-thirtieth For pressures on the finger tip it has been found to be about one-twentieth, for brightness of light about one hundredth, and for intensities of noise about one-third."[1]

As regards an individual becoming aware of a certain stimulus, what we ordinarily find is that the stronger the stimulus the greater is the intensity of sensation. If a light weight is placed on the head or hand the pressure felt is less than when a heavier weight is placed thereon. If supposing we put a certain weight A and find the intensity of pressure to be X, then when we increase A by a certain amount N we should expect a corresponding increase say N^1 in the intensity of pressure sensation. If we start with an-

[1] MYERS· *Text-Book of Experimental Psychology,* Volume I, page 245.

other weight and go on decreasing it, we should notice a corresponding decrease in the intensity of pressure sensation. And from this a rule should follow that an increase or decrease in the intensity of stimulus will bring about an increase or decrease in the intensity of sensation, which will be directly proportional to the former But as a result of experiments it has been found that it is not so

The decrease or increase in the intensity of sensation is not always directly proportional to the decrease or increase in the intensity of the stimulus The difference in the weight of Rs 100 (silver coins) and Rs 101 is one 'tola' as is that between Rs 10 and Rs 11, but the difference in the intensity of pressure that a subject feels in case of the latter is greater than in the case of the former. A room with a 100 candle power lamp will not be appreciated as being more brightly illuminated than another with a lamp of 98 candle power, but if the room had a lamp of 2 candle power and another 2 candle power lamp was introduced there it would definitely appear better lighted. Weber was the first to observe this fact and enunciate it, in a law known after his name According to Weber's Law "the just appreciable difference between two objects depends on the ratio of that difference to the magnitude of the objects, and not on the absolute difference between the magnitudes."[1] Fechner later verified and examined it, and enunciated it in the more accurate mathematical form, $S=K \log I$, where S is the intensity of sensation, I the intensity of stimulus, and K is a constant.

[1] Myers, *op cit*, page 245

We shall now consider each of the sensations separately

The study of sensations has acquired great importance of late because of its accessibility to experimental and quantitative work Since the days of Weber, sensation experiences of human individuals have been very thoroughly studied with the result that this is a section of Psychology where our knowledge is more advanced than in most other parts Experimental work on the different sensations has been large and of a high standard.[1] In fact the experimental work on sensation has been so thorough that the general lines of Psychological experimentation have been laid by this work and definite methods—known as the Psycho-physical methods for the study of sensations—have acquired a great theoretical importance for psychology as a whole.

The Sensation of Vision

Of all the sensations experienced by the human individual, the sensation of light, or vision is the most important Light is the physical energy which provides the stimulus and the eye is the part of the psycho-physical organism which receives this sensation What happens is that light rays passing through the cornea, the aqueous humor, the lens and the vitreous humor, strike the retina The different layers of the retina are stimulated, and the stimulation finally affects the sensory cells of the retina known as the rods and the cones. These are connected with nerve endings to the central nervous systems, the brain A sensation of vision is

[1] Woodworth *Experimental Psychology* (1939), preface

experienced by the individual when the nervous current reaches the brain.

Three different characteristics in the sensation of vision are recognized by human individuals.

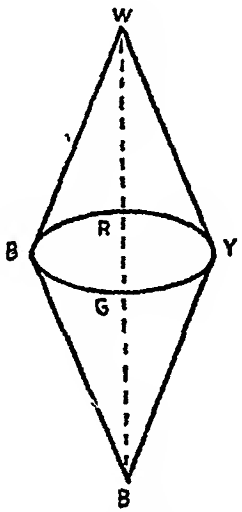
We recognize some sights as dark and others as bright. Darkness and brightness are the comparative qualities which we distinguish in any series of vision sensations. Brightness on the extreme end may be so intense as to give the sensation only of white, and darkness on the other end may be so intense as to give us the sensation of pitch-black. This characteristic of vision is known as Intensity quality or the *Intensity series* and runs from light to dark—from the brightest white to varying degrees of greys and on to the darkest black.

The second characteristic of our vision sensation is the colour of Hue quality. We recognize different colours—not only the seven proverbial colours of the rainbow, but in fact many more and some of which are not represented in the spectrum at all. Starting with the red colour we pass on to yellowish reds which become more and more yellow till we come to a pure yellow. We then have yellows running into green, thence on to bluish green, blue, violet, purplish red and black to red. This is known as the *colour-tone series* or the *hue series*.

Finally we have the different *saturations* of the same colour or hue We recognize the different saturations of a colour, for instance, the yellow as being either fully saturated (or fully toned) or pale and dull. Considering yellows of the same intensity we could

arrange them so as to pass from the most yellowish to lesser saturations of yellow till we arrived at a vision sensation that had no yellow in it but was merely a grey of the same intensity. This is known as the *saturation series*

We note that our varied vision sensations are a composite of the above three elements in various proportions. For example, the various tints that we recognize are really composed of (a) a particular hue with (b) a particular saturation and of (c) a particular bright-whiteness. The shades are similarly composed (a) a particular hue with (*b*) a particular saturation in combination with (*c*) a particular black-darkness.



Colour Cone

The sensations of vision are thus said to be three dimensional and are represented in a three dimensional diagram known as the *Colour-Cone.* This brings out

the relationship of the three elements of vision, one with another and also to the total sensation, in a fairly correct manner. The fully saturated hues are represented along a circle and the series go round from the red to the yellow, to the green, to the blue and thence through the purples back to the red. The blue and yellow are on the opposite ends of a diameter while the red and the green are approximately at the ends of the perpendicular diameter. A double cone on this circle represents all our vision sensations. The upper vertex represents the brightest white sensation and the lower vertex the darkest black. Cross sections of this cone parallel to the original circle represent all the hues at a particular intensity. At any particular intensity, as we pass from the circumference of the circle to its centre, we pass from a fully saturated hue to a grey of the same intensity. This axis of the cone from white to the black represents all the grey sensations we have, from comparative light greys to dark greys. The different points in the cone thus represent the myriad tints and shades we experience and also exhibit their relation with one another. We notice from this colour cone that the maximum number of hues possible are at medium grey intensity, and that as we pass on to either extreme intensity, the colour circles become smaller and smaller and colours of deep saturation are not possible.

THE SENSATION OF HEARING

The sensation of hearing is next in importance to that of vision. In hearing, the external ear receives

the sound waves, transmits them to the middle ear, which in turn passes on the sound sensations to the inner ear or cochlea which registers the sound sensations by appropriate nervous currents to the brain.

Our sound sensations have at least three characteristics First, the "pitch". This consists in our capacity to recognize a sound as of a higher or a lower pitch This characteristic corresponds to the physical characteristic of the wave-length of the sound wave. Our ears are sensitive to sound waves within a certain range only. The lowest audible sound is of about sixteen vibrations per second and the highest one of about 30,000 per second.

Next, we are capable of distinguishing the characteristic of *intensity* in our sound sensations. In virtue of this we are able to distinguish certain sounds as more or less loud. The physical counterpart of this is the amplitude of sound waves.

Further, two sounds which are of the same pitch as well as intensity may still appear to us to be different This is due to our recognition of *quality or timbre* of the sound. Two notes, of the same pitch and intensity, one sounded on the piano and the other on the violin are easily recognized as different because of this third characteristic of timbre. The physical counterpart of this characteristic in the sound wave is its composition. Unless produced under special conditions, a sound wave of a particular wave-length and amplitude is always accompanied by sound waves whose wave-lengths are sub-multiples of the original The original note is known as the *fundamental* and the others are known as

overtones. The overtones present in a particular sound vary according to the source of the sound and are the cause of the characteristic timbre of the sound. Human voices are distinguishable because of the richness of their overtones.

Lastly, a fourth characteristic of our sound sensations, namely *voluminousness* is sometimes recognized. Calkin[1] writes, "The roar of the waves on the beach is not merely a deeper pitched, nor always a louder sound than the voice of the child at play beside them. it is also what we may call 'bigger', 'vaster', more 'extensive' or more 'voluminous'. This sound bigness or volume, it should be added, varies with the pitch, for the lower the pitch the bigger is the sound; yet volume is not identical with pitch." Watt[2], a well known worker in the psychology of sound, also recognizes this characteristic and bases his now generally accepted theory of audition on this characteristic of our hearing.

Sounds are again of two distinct types; the musical and the noises. When the sound waves are *periodic* and strike the ear at regular intervals of time, the sensation we have is that of a musical sound It is in the musical sound that we recognize the above three or four characteristics clearly. When the sound waves are *unperiodic i e.,* strike the ear at irregular intervals, our sensation is that of *mere noise,* which is disagreeable to the human organism.

[1]CALKIN: *Introduction to Psychology,* page 93.
[2] WATT. The Psychology of sound.

Taste and Smell

The sensations of taste and smell are not quite so complex as the others Taste and smell are closely associated together and were it not for our smell sensation, most of our daily food would appear to be quite "tasteless" Tea, coffee and quinine, all have the same taste and would not appear to be different if we exclude their smell sensations which are present in their complex "tastes" with which we are familiar.

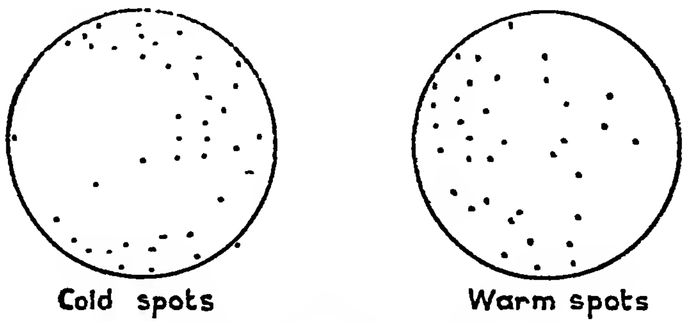
By many careful explorations of the surface of the tongue four kinds of taste sensations have been discovered. These are *bitter, sweet, sour or acid* and *salt* —the tastes given respectively by quinine, sugar, lemon juice, and salt

The Skin Sensations

We have many skin sensations such as rough, smooth, hard, soft, hot, cold, itching, tickling, pricking etc, but most of these are compound sensations

If we explore the skin by a blunt metal point a few degrees cooler than the skin temperature, at most points no sensation except that of contact is experienced. At certain points, however, there is a clear sensation of cold, these are known as the *cold spots* of the

skin, and at these spots only the sensation of cold is felt.



On the same part of the arm

If next, we investigate with a metal point some degrees warmer than the skin, a definite number of points will be discovered which alone give the sensation of warmth. These are known as warm or *heat spots* of the skin.

Again, on investigating the skin by a sharp-point, such as a needle point, the point being moderately pressed against the skin, it will be found that at most points we have only the sensation of contact. At a definite number of points, however, a sharp pain sensation is felt. These are known as the *pain-spots* of the skin.

Finally, the skin possesses definite *touch-spot* which can be investigated by means of a hair of proper length and thickness. At most points no sensation will be felt, and only at touch spots, the minimal pressure of the hair arouses the sensation of pressure or touch.

No other varieties of "spots" are found, and the four sensations of touch, warmth, cold and pain are considered to be the elementary skin sensations. Itch, stinging and aching are the same as pain Tickle is touch, usually a succession of light touches. Smooth and rough are successions of touch sensations. Moist is usually a compound of smooth and cold.

We do not notice the punctiform distribution of sensitivity in the skin because ordinarily because large areas of the skin are stimulated together at any particular time It is only when we explore the skin by punctate stimuli that we discover its lack of uniform sensitivity

Kinaesthetic Sensations

These are the sensations of movements and inform us about the position of the body and the mutual relations of our limbs They are derived from our muscles, tendons and joints.

When we move our finger, elbow or foot, we experience a kinæsthetic sensation, or rather a series of kinæsthetic sensations which inform us about the amount and direction of the movement of the limb. Kinæsthetic sensations only rarely occur alone in our experience and are usually accompanied by our visual or cutaneous sensations For example, when we move our hand, our sensation of the position of the hand is jointly a kinæsthetic and visual sensation. It can however be shown easily that even after closing our eyes, we retain the sense of the changed position of the limb

Estimation of Weights. Our kinæsthetic sensations are the primary basis of our judgment of weights Our method of estimating the weight of an object is by lifting it and lowering it with the hand. The amount of effort put forth in lifting, and the ease with which the object rises in consequence, influences our estimate of weight, specially in comparative weights of two objects, in curious and interesting ways The effort we put forth is normally guided by our visual perception of the object. Consequently we may find the larger unexpectedly light owing to the ease with which it is lifted and the smaller object unexpectedly heavy owing to the small amount of effort put in to lift it. This is known as the *size-weight illusion*

If two objects of the same shape and weight, but one of which is double the size of the other, be presented to the subject, he estimates the larger to be much the lighter. So persistent is the illusion that even when he has seen the two objects weighed, and knows them to be equal, he still feels the larger to be the lighter. The illusion persists, even when the eyes are closed, if tactual sensations enable the subject still to apprehend the size of one object as compared with the size of the other. If, however, measures be taken to prevent any apprehension, visual or tactual, of a difference in size, there is no illusion The illusion is greater with adults than with children

Sense Training

Sensory acuity and sensory defects are related to the educability of an individual. Sharpness of dis-

crimination is an asset in the learner, and sensory defect handicaps the individual in the process of being educated Total blindness is one of the defects that changes altogether the mehod of instruction, and necessitates the transference of the child to a special school where compensatory methods are adopted. So also deafness is a defect owing to which the child needs to be sent to a special school So far as other defects of visual and auditory senses are concerned, the child suffering from them generally remains in the ordinary school A knowledge of the specific defect helps the teacher either to suggest aids to meet the defects (*e g*, suitable glasses, etc), or to modify the instruction for the particular child so that his time may not be wasted.

Deficiencies in senses in general bring about retardation in the child's development Sometimes the defect happens to be connected intimately with the study of a certain subject or group of subjects, and naturally the child's progress therein is impeded Defects in kinæsthetic sensibility interfere with progress in educational handwork, games, physical exercises; colour blindness interferes with the work in Chemistry, Nature Study, and so on. Kennedy Fraser quotes the case of a university student "who, not knowing that he was colour blind, specialized in Chemistry, and only discovered his unfitness for this study when he came to practical laboratory work and found himself unable to discriminate between the colours of the precipitates Had he been aware of his

defect by the very simple test necessary he would not have wasted a year of his time of study."[1]

Sense training is one of the problems of education. It is demanded of the teacher, that he should train the senses of the child through certain courses of study and methods of instruction. What does sense training stand for? If by that is meant the development of sensory acuity, it has no meaning. So far as the sensory acuity of a child is concerned, it is developed much above his needs, and it would be highly doubtful to assert that the sense-organs can be further developed by a course of suitable stimulations. The possibility of developing the physiological apparatus has been seriously doubted, but some are inclined to hold that such a development is possible.

Whatever that be, one thing which is important for the educationist is, that since sensation is the means by which the child attains a full understanding of the nature of his surroundings, his sensory experiences must be both rich and varied. He should be provided with as many opportunities as possible for coming in contact with sense material which is useful for the comprehension of his environment His crude sensory experiences have to be corrected, reformed and cleared. The great aim of sense training, according to Drever, "is the giving of the child necessary and typical perceptual experience, the correcting, supplementing, and systematizing of the unsystematic sense experience of his every-day life."[2] Children of normal

[1] KENNEDY FRASER: *The Psychology of Education*, page 54.
[2] DREVER: *An Introduction to the Psychology of Education*, page 188.

intelligence are so often found to be poor when examined as regards their sensory experiences Montessori's sensory exercises are mostly intended to refine and correct the faulty experiences which they may have gathered in a haphazard way. With the help of sensory exercises she hopes to "make it possible for the child to distinguish and to classify" accurately.

What should be done to make the child s sensory experiences rich and varied? In order to increase the stock of his experience and multiply it, should the number of his experiences be indiscriminately increased? If we want to make him richer as regards auditory sense-experience, should he be made to hear a large number of sounds? Or, if we want him to have a large number of visual sensations, should we put before him as many different colour shades as possible? Such a procedure would undoubtedly stimulate the physiological apparatus again and again, but would hardly be of any educative value The stimuli given should have a meaning and a purpose to the child. There must be an object in the experiences which the child is given, in order that the experiences may be of some value. Sense experience is to comprehended the surroundings The activity must involve some necessity—a purposive manipulation of the environment. To take an example, different shades of colours visualized with a view to understanding a colour design or to constructing one, would have a real educative value.

Perception

Sensation is the response of an organism to the stimulus received from its environment. The nerve current from the sense-organ is stimulated, and in turn stimulates the sensory area of the cortex. The response, so far as it is made by the sensory area, constitutes sensation When the object from which the stimulus comes is mentally apprehended, then we say that we have perception of the object. This apprehension is not possible until and unless first of all the sensory area has responded to the stimulus; in other words, until sensation has taken place. Sensation is thus the first response to stimulus, and perception may be considered the next response of the organism following on sensation According to Woodworth, in perception "the chain of the events is: stimulus, response of the sense organ and sensory nerve, first cortical response which is sensation, second cortical response which is perception."[1]

Physiologically, in sensation the sensory areas of the cortex are affected, while in perception the cortical 'regions adjacent to the sensory areas' are influenced. Psychologically, in perception there is mental apprhension or cognition of however crude a nature it might be. We may experience a haze of light and thus far it will be sensation, when we see the object stimulating that sensation, we have a perception of it Hearing a sound is sensation, but knowing it as the sparrow

[1] Woodworth. *Psychology*, page 423.

chirping is perceiving it. Drever and Collins define perception as "the immediate apprehension of an object or situation affecting any or all of the sense-organs by way of sensation. It is the most elementary form of cognition, and indeed of experience"[1] Although sensation is the means through which perception arises, sensation cannot be called a mental process. The simple mental process to which our experience can be reduced is perception "Pure sensation is merely an aspect, never the whole, of experience, and bare sensation does not exist in the concrete."

Our perception of any object, say a guava, is not merely a mass of sensations that we receive from the object There is the yellowness, the sweetness, the softness, etc , which, if jumbled together, do not give the perception "guava" The sensations are undoubtedly there, but they have meaning to us, depending on images of past experience. The perception is made up of sensations and images[2] Our whole experience is implicit, and during the act of cognition no image seems being recalled, although it is included in the implicit experience. We should not be wrong in

[1] COLLINS AND DREVER. *Experimental Psychology*, page 107.

[2] The question may be asked if in the experience called perception an image is involved (this image obviously being as result of the past experience), what about the very first perception which an organism has? Whence does the image come there? We possess the instincts or innate mental dispositions, which make us perceive and attend to certain specific objects Our subsequent perceptions undoubtedly are coloured by the images of the instinctive behaviour we first have. In fact, the perception of a certain object of instinct-interest, when it takes place on subsequent occasion, is not the same as on the first occasion It is coloured by experience

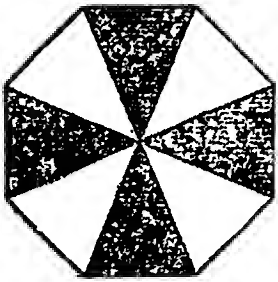
saying that we perceive the guava, and then know it is an object which is round, yellow, sweet, soft, etc.

The Gestalt psychologists have cleared the nature of perception by emphasizing the fact that perception is not a bundle of sensations. It is not made up of a number of discrete impressions, but it is a whole experience which is different from the sum of its parts which we get on analysis. In perceiving a single object we perceive it as a whole. The experience is implicit, and while the parts can be made explicit, so far as that experience goes, they have no separate existence.

The Gestalt psychologists have done several simple experiments, and examined the nature of various sensory illusions According to them, the essential feature of perception is, that it is the apprehension of a situation. Again, no element of the situation is apprehended separately, but is experienced in the whole setting in which it exists. They emphasize the relational aspect of a percept. Each percept is apprehended in a setting and appears altered according to the change of context. Any object that is perceived, say a particular tree in our compound, is related to its various contexts which may be sensory, or ideational, or affective, or all. The percept of the tree is affected by the ground on which the tree stands, by the other trees in its vicinity, by the sky, etc., which form the background. The percept may be coloured by some tinge of pain or pleasure All these relational factors exist implicity in the percept and are not made explicit. But should the background—sensory, or ideational, or

affective—change, the percept of that same tree would change. Just as in the case of a picture, as the background makes the picture look different so also in the case of a percept.

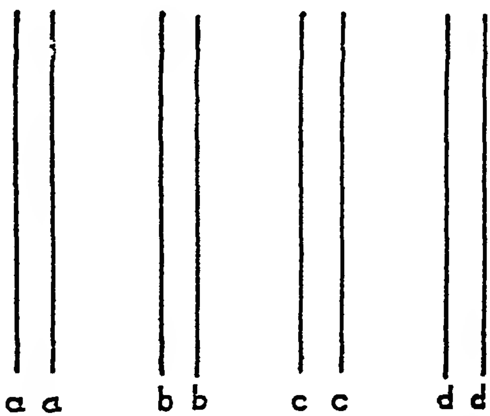
The perception of an equivocal figure clearly brings this out. In a figure as given below, we may have the perception of a black star on a white background, or a white star on a black background. There may or may not be the suggestion of a star, and in that case the whole figure will look a white and black colour design on white background



In any perception three aspects can be distinguished. We have emphasized the 'relational,' and shown that a percept is what it is, in virtue of its being in a certain setting The other two aspects have been called 'presentative' and 'representative.' By presentative is meant the momentary sense-impressions which are received by the mind. By the representative is meant the memory images which are brought to the mind, and which help in the comprehension of the sensory impressions In the crude act of mental apprehension

which we have in a perception, sensation, image, and relation to background, are all involved. In a percept which is clear, it is easy to see how these aspects have characterized the apprehension

According to Gestalt psychologists, the apprehension of the 'whole situation' or the working of the Law of Wholes is the most important characteristic of perception. An apt illustration of the working of this law in visual perception is that of the so-called "fence" phenomenon. Eight lines, a, a, b, b, c, c, d, d, are here



drawn as in the accompanying figure Now, here we have drawn eight straight lines, yet if somebody is naively asked to report what he sees, he will state as having seen four pairs of straight lines. This brings out the essential characteristic of perception, namely perceiving the straight lines not separately, but as a *whole* in a certain *pattern* or configuration or *Gestalt.*

On the theoretical side, the law of Wholes or Gestalt has far reaching implications. It emphasizes the fact

that our perception, although guided by sensation, is not wholly controlled by it Sensations having been received, the mind starts functioning in its own right. It is the mind which does the internal organization or integration of the experience before its being apprehended as such by the individual The percept thus possesses characteristics absent in its elementary sensations Gestalt psychology has thus brought back the emphasis on the mind, the internal agency, although in a rather unexpected manner, through objective and experimental work

This integrative activity of the mind must be understood by all those who are concerned with depicting the perceptions of an individual The essential problem of the artist, for instance, is to analyze his "cues" *i e*, to know what objective presentation is needed to create the desired percept Our perception of the wheels in a carriage for example, is that of circular wheels and yet, the sensation which produces this perception is not circular but elliptical as all students of physics know The artist must therefore draw ellipses so that the individual may perceive circles The problems of perspective for the artist are thus common illustrations of the practical implications of the Law of Wholes

The second law of perception enunciated by Gestalt psychologists is the *Law of Figure and Ground* Perception of the whole situation having taken place, this law states that the tendency of the mind is to be aware of certain parts in the situation as the "figure" and the remaining as the "ground" Elements which are impor-

tant to the mind appear as the "figure" which is perceived in the setting of the remaining and less important elements namely the "ground"

The formation of the "figure" is governed by the following laws which are enunciated as follows:—

I The Law of Proximity: i e, elements which

O+ O+ O+
X X X

are close together in a situation have a tendency to form an unit, a group or a figure

II The Law of Similarity i e, elements which are

O O O O O O O O O O O O O O O
+ + + + + + + + + + + + + + +
X X X X X X X X X X X X X X X

similar in a situation have a tendency to group together i e., form an unit or a figure.

III The Law of Homogeneity in Colour and Brightness i e., elements possessing the same colour and brightness in a situation tend to form an unit or a figure

IV The Law of Symmetry.
i e., elements which are symmetrical to one another in a situation have a tendency to combine together to form an unit or a figure.

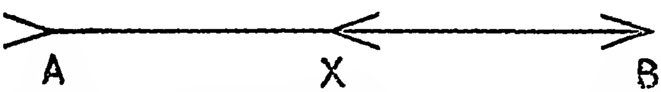
The above laws have been summed up together in what is generally called the Law of Pregnanz or "Goodness". This states that elements in a situation have a

tendency to group together and form a "figure", if they, *together,* possess the characteristic of "goodness" *i.e.,* the characteristic of "satisfyingness" generally.

Gestalt psychologists have been responsible for much useful experimental work on perception and they have been able to explain some of our more complicated phenomena of perception One such instance is the perception of the moving figures in the modern cinema. Perception in this case is a composite perception in time and space Different pictures are shown successively in point of time, and our experience is a composite spatio-temporal whole which gives us the illusion of movement of certain figures in the whole

The familiar geometrical-optical illusions are also easily explained on the basis of the Gestalt Laws of Perception Geometrical optical illusions are generally of two varieties (1) The illusions of distance (2) The illusions of direction Try the following simple experiments and see how an illusion in perception occurs when the situation as a whole is changed

Take a straight line AB Divide it into two equal parts at X, so that AX=XB Here the perception is also that of equality between AX and XB Now introduce arrow-heads at A, X and B, as illustrated below.—



XB now appears shorter than AX, although, of course,

both of them are actually equal. This phenomenon is generally known as the Mullar-Lyer illusion of distance.

The following illusion of direction may also be tried.—

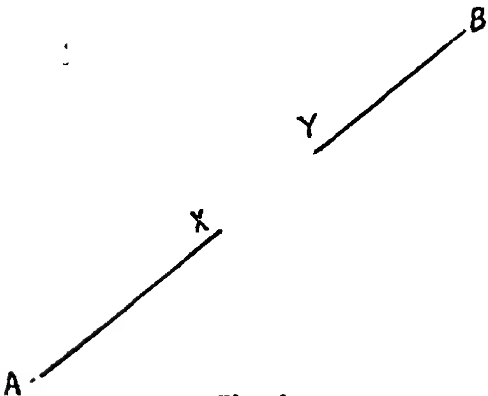


Fig i

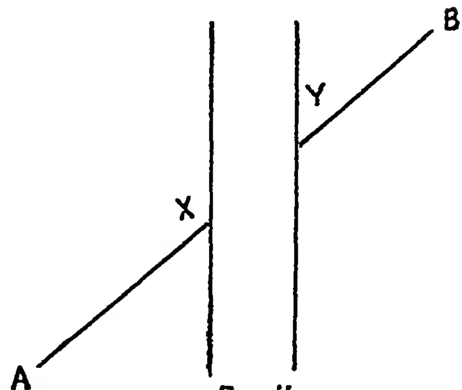


Fig ii

AX and XB are parts of a straight line and are in the same direction both in Figs i and ii above. In Fig ii, however, a pair of vertical parallel straight lines has been drawn to intercept the two parts AX and YB The percept now changes, and the whole is perceived such that AX and XB do not appear to be in the same continuation. With the addition of certain elements, the whole percept is radically altered and acquires characteristics absent in any of the elements.

Children's Percepts—Time and Space

Children's percepts are crude and not clear. The child's idea of the world as stated by James consists merely of 'a big, booming, buzzing confusion' In children's percepts there is generally something wrong with presentative or representative elements. It is

often found, that the representative element is altogether insufficient, or too profuse In the former case, the child is unable to understand correctly the sense-impression In the case of the latter, which is mostly the characteristic of "children's lies," and "children's drawings," the child does not apprehend the sense-impression, but imagines something according to the images which are revived at the moment.

Children imagine what they do not see, and say something which sounds to us like a lie In drawing an object which is present before them, they put in such items in the drawing which are a result of imagination rather than observation They draw what they know and not what they see As age advances there is not only increase of perceptual experience, but the percepts are rendered distinct and accurate It is the business of education to increase the range of perceptual experience for the child specially in the earlier periods, so that not only do the percepts become more and varied, but are rendered clear, correct, and definite. It is percepts that lead to ideas and concepts, and hence their accuracy is extremely essential

Children have to have percepts of various objects, of time and space, and such other things as are essential for mental development When they come to school, they are not at all rich so far as their mind content is concerned It is limited, and also differs with different children; hence the teacher has to be very careful in making presumptions Stanley Hall made a number of investigations on this matter, and he holds that in the lowest class where schooling

starts, it is proper for the teacher to start with as few assumptions of child's knowledge as possible.[1] The description of pictures is a method which has been suggested by Binet and Stern to find out the nature of children's knowledge and perceptions. They both suggest showing a picture and putting some questions based thereon. They have both classified[2] in their

[1] DUMVILLE quotes some of the results of STANLEY HALL's investigation. *child Mind*, page 40

Children's Ignorance of Common Things.

Name of object	Percentage of children ignorant of it — In Boston	In Kansas
Beehive	80 9	59 5
Crow	77 0	47 3
Ant . ..	65 5	21 5
Squirrel	63·0	15 5
Oak	87 0	62 2
Rainbow	65 0	10 3

The figures vary most extraordinarily In this country the figures would be entirely different. Oak will give 100% ignorance, ant and crow may give hardly 5%.

[2] BINET's classification

Age 3 year ..	enumeration	stage	(the child names individual items only)
„ 7 „ ..	description	„ ..	(the child connects items)
„ 12 „ ..	interpretation	„ ..	(the child connects meanings with what is seen)

STERN's classification.

Up to 7 years	substance	stage ..	(the child names individual items only)
7 to 10 „ .	action	„ ..	(the child is able to say what the objects are doing)
12 to 14 „ ..	relation	„ ..	the child can say how the objects and their actions are related to one another)
14 years and above	quality	„ .	(the boy or girl is able to comment, judge, and criticize)

own ways the responses of the children and shown how they correspond with mental development and the age of the child.

An investigation into the child's ideas of time and distance will disclose that these notions are not at all definite in early stages, and there are limits beyond which the child seems unable to penetrate. Slowly and gradually does the child grasp the relation of objects in these directions. While the education of ordinary life influences this development, even in specific education the necessity of helping this development cannot be lost sight of. All objects which are perceived by the child are perceived in spatial or temporal relationship. Sometimes the relationship has to be explicitly expressed, at other times it is included in the whole implicit apprehension

The fundamental factor in grasping spatial relationship is the kinæsthetic sensibility. The child learns through movement of his limbs as to how far and which way he has to move in order to take hold of objects. These objects are reached according as they are near or far, above or below, to the left or to the right. The spatial categories which are the first to be cleared are those of direction and distance By handling the objects and fitting them together the child gets the idea of occupancy of space, and consequently of size. To a certain extent these exercises also impart the idea of form In kindergarten work a positive attempt is made to choose suitable

geometrical objects, and facilitate their manipulation so as to clear the ideas of size, form, and direction.

Movements help the grasp of distance. The child is quite keen in judging short distances with his eye.[1] The grasp of long distances takes rather a long time with the child He works with certain units The foot, yard, or a step may soon become easily clear. But the visualization of longer distances or their manipulation in mind takes time to be correctly done Distances in miles are not correctly apprehended Only such distances as are actually traversed are easily understood. Not to speak of children, uneducated adults like some of villagers, have no clear grasp of long distances. The most difficult aspect of spatial relationship which the child has to grasp is that of dimensions. The difference between two dimensional representation and tri-dimensional one is not grasped by younger children at all. It is late in boyhood that the distinction is appreciated, and the conception is exact only when solid geometry is studied. An

[1] RUSK: *Introduction to Experimental Education,* page 63

"The judgment of distance by the eye is with the child fairly exact for short distances; in the case of children of six or seven years of age this is not much behind that of the adult, and it is thus evident that it is very early developed. Menmann also states that the visual illusions are very early recognized by children—even by children as young as six. With regard to the over-estimation of the length of vertical lines relatively to horizontal—an illusion which it is important to recognize in drawing instruction—it seems that it is less with adults than with boys in junior classes, and Winch has demonstrated that it decreases with increasing age and school progress."

attempt, however, is made through certain topics in science and mathematics to give exact ideas of areas, and volumes.

The child's conception of time is very meagre Temporal apprehension develops later than spatial apprehension Shorter intervals are more easily grasped than longer ones The comprehension of long-time intervals is rather an abstract affair, and develops along with the growth of the general conceptual powers of the child Ordinarily the child is able to understand events as referred to a day or two in the past or in the future Even as regards what a day is, it is not until practical lessons in clock and watch reading are given that a child gets to know it as representing a certain duration Day is regarded as something when we have light, and which is opposite of night when we have darkness There is confusion again as regards the duration of seasons The child only seems to understand the change as dependent on climatic conditions, and not in terms of the time that such change occupies Dates in history, in the earlier stages have no significance with the child, unless accompanied by some of the visual devices which represent temporal relationship on spatial basis So far as events far too distant are concerned, distinguishing between their relative positions becomes a difficult affair As in space "beyond a certain distance, everything appears in the same plane, ... all stars seem equally distant," so also in case of time "distant events appear all in the same plane, this plane receding with increasing experience"

Investigations[1] and observations on time sense have been interesting, but generalizations on the basis of stray cases cannot be made. What they tell the teacher is, that he should be cautious in making assumptions on the time sense in children. Rigorous exactitude as regards correctness of ideas imparted to children cannot be overemphasized. An error made during the period of formation is liable to do incalculable harm. Concrete means and methods must be employed as aids to help children in accurate comprehension of abstract relationships in early stages.

Perception in Reading

The nature of our reading process is effectively explained on the basis of the Gestalt laws of perception. When an individual reads some material, he does not pay attention to the individual letters, but perceives words, phrases, or even sentences, as a whole.

An illuminating experiment which may be performed in this connection is done with the apparatus known as the simple Fall Tachistoscope. This apparatus exposes letters, words or other visual material for only a brief interval of time, between 1/5th to 1/100th of a second. The subject is thus able to pay attention to the exposed material only once, as only one act of attention is possible within this brief time-limit.

[1] Rusk: *op cit*, page 66

"A boy aged five, whose life history the writer knew intimately, could not be made to date anything beyond 3 weeks; at 7½ years of age he would go as far as 6 months but not beyond it. Another boy of 8 years of age would likewise not go beyond 6 months"

In this experiment,[1] when separate and unconnected letters such as "P D O R" are exposed, the subject is able to read about 4 or 5 letters (which are known as his span of apprehension). In the experiment, next, if letters forming meaningful words such as "COLLEGE" are exposed in a similar manner, it is found that the subject is able to read words as long as those containing 10 or 11 letters, or, even longer Thus much longer meaningful words are read at one glance than unconnected separate letters.

The reason for this is found in the nature of the perceptive process. The subject perceives a word as a whole, only paying attention to certain prominent characteristics of the general shape of the word, and, while in the act of reading, never analyzing the word into its component letters The subject is thus able to read words containing a large number of letters as compared to letters not forming any familiar word

This is again verified in another way If in the familiar words exposed, a slight alteration in the correct spelling of a word is made, the subject still reads the original word and does not notice the slight inaccuracy in the spelling This happens because he does not pay specific attention to the individual letters of the word in the act of perception.

This characteristic is very essential for a reader in order to develop his reading efficiency If the reader found it necessary to take into account every separate letter before being able to perceive a word or a phrase,

[1] BHATIA *Perception in Reading* Teaching Vol XVII No 2, p 50

the reading process would be a very laborious one and the speed of reading very slow. The test of the efficiency of a reader really is the amount of the reading matter he is able to perceive in one act of perception A study of the eye-movements in the reading of children and of practised readers have disclosed great differences between the two in this matter.

Bushwell[1] and others have done extensive experimental work in this connection. With elaborate photographic apparatus, they have obtained reliable records of the eye-movements of a subject while reading certain material. It has been found that the eye does not move uniformly in the act of reading a printed line, but moves in jerks from point to point Such eye-movement is technically known as "saccaddic", and the points where the eye stops are known as "points of fixation".

As the eye moves forward in jerks from point to point in its attempt to perceive the material, the inexperienced reader has to stop at many more places than the experienced reader. The unit of perception of the child is much smaller than that of the mature reader and consequently he has many more points of fixation than the latter. The utility of what is known as "rapid-reading" is that it gives children practice in enlarging their unit of perception and thus minimizing the points of fixation. It has been found that even adult readers who have not received such practice at the opportune moment, remain at the child level in this matter to the end of their lives and always read slowly and laboriously.

[1] SANDIFORD: *Educational Psychology.*

Another characteristic of an inexperienced reader in connection with his eye-movements is that of "regression". This consists in a tendency of the eye to go back to a previous point of fixation instead of moving uniformly forward This is another great handicap in efficient reading and must be carefully eliminated to acquire a fluent reading habit.

In oral reading, the co-ordination of the eye and the voice has to be maintained In reading aloud the eye keeps ahead of the voice and the distance the eye of a reader keeps ahead of his voice is known as his *eye-voice span* Experienced readers have a large eye-voice span and hence they read aloud with confidence The eye-voice span of children is comparatively small and he reads almost the same word which he is looking at the moment. This makes their reading uncertain Training children to be good oral readers means that their eye-voice span should be developed sufficiently

1 OGDEN : *Psychology and Education*, Chapters IX and XI
2 STOUT : *A Manual of Psychology*, Book II, Chapter I.
3 MYERS : *Text-Book of Experimental Psychology*, Chapter XIX.
4 COLLINS AND DREVER : *Experimental Psychology*, Chapter VI.
5 WOODWORTH · *Psychology*, Chapters X and XVII
6 RUSK *Introduction to Experimental Education*, Chapter V
7 SANDIFORD : *Educational Psychology*.

CHAPTER VIII

Attention

One of the important things that a teacher has to do, in order to be able to carry on the business of teaching, is to secure the attention of his class. He finds boys inattentive, and adopts means and methods to fix their attention upon the work in hand. The faults that the boys exhibit may be of two main types. Boys may not be attending to the work in hand but to something else that may seem interesting to them, or their attention may be wandering from one thing to another. This latter state of affairs shows a weak mind, and is really what calls for serious attention on the part of the teacher. The former is just a case of inattention which is common, and is due to something being more interesting than the lesson. In this case, if the lesson is made more interesting the child is spontaneously attracted to it To secure attention by the rod or by some stereotyped formula in every case of inattention is a mistake Before discussing the pedagogics of attention we shall first examine the psychological nature of the process

Attention as the Selective Activity of Consciousness

Perception is the mental apprehension of any object external to us. This apprehension is implicit.

and takes place so rapidly that we regard it altogether momentary in its occurrence. The time, however short, is appreciable Sensation which is a preliminary process for perception takes some time; obviously the latter also does It is easy to show, through tachistoscopic[1] experiments, that the time taken for perception is significant What happens in perception is that the sense-impression is held before the mind for a time which is just enough for its crude comprehension Of course, in case of apperception the time is generally a little more Now at the time when the impression or idea is being held before the mind for interpretation we are said to be attending to it. Attention, in general, is the act of holding an impression or idea in the focus of consciousness. Ordinarily, however, the term attention is used for a more protracted mental process

James compares consciousness with a stream which flows constantly All our thoughts, sensations, ideas, in fact all that we mentally experience, constitute this stream of consciousness Some of the elements of this stream assail the focus of our consciousness, others pass along undifferentiated not entering the focus What is in the focus at a certain moment is not liable to remain there for any length

[1] A tachistoscope is a piece of apparatus meant for exposing an object (a word a small picture, figures, symbols, etc) for a very brief space of time There is an aperture through which the object is exposed The aperture is provided with a shutter which can be electrically manipulated. The time of exposure can be manipulated with the help of a suitable mechanical device (For a detailed account see MYERS: *Experimental Psychology*, Vol. II, pages 64-66)

of time. It passes off into the undifferentiated margin, while some element from the margin enters the focus. There are other marginal elements which never enter the focus at all. Some elements having gone out of the focus may come in again. Others having been once may never return a second time, and so on.

Various elements come to the focus and go out of it. That which is in the focus at a certain moment constitutes the specific consciousness. But the elements of the margin, despite the fact that they are undifferentiated, influence the mental experience of the moment. As I am writing these paragraphs I am sitting at the table; my fingers are receiving the pressure from the fountain-pen, the nib is making a sound as it is gliding along the paper, my body is experiencing the soft seat of the chair, there are some children playing hockey in the ground nearby, and the sound of the hitting of the ball comes to my ear; the clock is also ticking in the room: there are various ideas passing through the mind. While all this and much other constitutes my sense-impressions and ideas at this time, my attention is rivetted on some particular idea relating to 'attention.' Except that particular idea on 'attention,' which is being dissected at the moment, the rest is all in the undifferentiated margin. Should the chair give way, I shall feel the change. Should the pen have no ink left in it, it will come into my focus. Should one of the ideas slip, there will be obstruction in thought. The marginal part of the experience plays a part in determining

the movement of the stream of consciousness In this example some idea or 'attention' has been in my attention, the rest has been marginal But a few moments later it may not be 'attention' but something else Our mind possesses the capacity of regulating the passage of elements from the focus to the margin and *vice versa* It makes a selection from amongst the various elements which are in the margin, and allows some to come into the focus This 'selective activity of the mind' has been called attention

Attention is a mental activity, a process, not a fixed state, and hence this selective activity is a continued activity As a mental activity it has a teleological aspect The essence of every activity is that it should be directed towards an end Every specific process of attention tends to achieve a certain object. Therefore in attention as a mental activity, emphasis must be laid on the conative[1] aspect of the experience rather than on the cognitive one

Subjective and Objective Attention

According to Drever, "selection is a fundamental characteristic of the psychical" What does this selection depend upon? Is the psychical lawless in this matter of selection, or is it bound by some con-

[1] Stout *Analytic Psychology*, Vol I, Chapter VI

'Conation and attention agree in having a dynamic aspect' The only distinction between striving and mere attention in their dynamic aspect as the distinction between, '(1) the direction of metal activity to an end, and (2) the activity itself in the successive phases of the process through which the end is realised''

sideration in bringing elements into the focus of consciousness? Selection is a mental reaction, and hence it follows the general characteristics of the reactions of a living organism. The selection is determined from within There are purposes to be served, and the selection is accordingly made.

What are these purposes which regulate the selective activity of the mind? They are the interests of the organism It is these that force him to cognize and to perceive certain things in preference to others McDougall's definition of instincts emphasizes the fact that the organism possesses psychological dispositions which necessitate the perception of certain objects, and the consequent attention to them on the part of the individual We should not be wrong in saying that 'the selective activity of consciousness,' which we have called attention, is thus controlled by instinct-interest What other interests regulate this selection, whether this selection is altogether of a subjective nature, or it can be objective as well, are questions which we will presently examine

It is commonly held that there can be two conditions of attention We attend to a certain object because we are interested in it (interest being used in the widest possible sense), or because there is something in the object which forces itself into the focus of our consciousness The first condition arises out of the fact that the individual is interested, and hence it is subjective. If the individual has no purpose, no interest (native or acquired) to serve, the particular object cannot be made an object of attention. The

second condition is said to arise out of the fact that the object possesses certain characteristics which compel the individual to attend to it. This condition of attention can be termed objective. Some psychologists have distinguished this type of attention which is based on objective conditions by a rather unhappy phrase 'passive attention'.

In our actual experience we ordinarily seem to notice both these conditions of attention operating. We are impelled by our interests, and we attend to various things to satisfy these desires of ours. We also find that the intensity and suddenness of certain sense-impressions assail on our mind and we have to attend to them. A loud noise, or a strong flash of light, by virtue of its own strength, compels us to attend to it. Guided by such experiences as these we are led to acknowledge two conditions of attention.

But the question may be asked. Is the distinction ultimate? Is there anything like objecive attention specifically so? The intensity of sense-impression, or a strong sensation, ordinarily appears to determine the attention, but does it really do so? Is not the subjective element even in this determination significant, if not quite supreme? These sense-impressions excite in us the impulses of curiosity or fear, or sometimes even both, and, compelled by the instinct-interest, we give the attention. The determining condition is the instinct-interest rather than the objective state Frequently we do not attend to a certain sound which is sufficiently loud, while we do attend to another which is much less so. A loud sound with which we are

familiar, say a railway whistle, does not sometimes draw our attention in the same way as a meaningless hissing does. We know the source of one, and it neither excites curiosity nor fear, the other which is not known excites one or both as the case may be.

In general, it seems difficult to wholly accept that intensity and suddenness of sense-impressions are in themselves determinants of our attention.[1] The objective conditions in themselves are not enough. The subjective control is more important The objective conditions in such cases, undoubtedly offer the occasion for the mental activity called attention. The organism does not seek and obtain a field for this mental activity but is offered one and utilizes it. We could accept the subjective and objective distinction in this sense.

The Nature of Interest

The selective activity of the psychical is determined by interest. We have examined the nature of interest to a certain extent; we shall consider now more fully what it is. Is it a process, or is it a lasting disposition, or merely a passing agent which sets the

[1] Speaking generally we, however, accept the fact that so long as our sensory receptors are not benumbed we are forced to attempt momentarily to any sensation that is so intense as to disturb our physical equilibrium. Here, again, one may argue that the organism attends in its own primitive biological interest—the interest of self-preservation. Hence a distinction, in so far as it refers to the dynamic aspect of the experience, cannot be accepted The conation is entirely controlled by the organism. We may accept the dintinction so far as the initiation of the process is concerned, not so far as its successive stages are to be determined. And, since in attention we emphasize the conative aspect, the distinction is rather unimportant to us.

ball rolling and vanishes? In attention the conative phase of mental experience is important. That being so, the factor which sustains it cannot be a passing event It must be an enduring disposition Interest must be something which will keep a supply of the driving power needed for conative activity.

By nature all organisms are interested in certain objects—objects which evoke instinctive impulses. The intensity with which the impulse is evoked is directly proportional to the interest, and hence the attention which the organism gives in carrying through the conative phase of the instinctive response is proportional to the interest The stronger the interest the greater is the force that the conation receives. This is brought out so clearly when the instinctive behaviour of animals is examined A hungry animal attends more intently, and strives harder to attain his end than another who has had a full meal In the case of man, the condition which govern the evoking of interest, and the consequent attention to the object or idea or action, are rather complex, but the attention, all the same, is directly proportional to the interest evoked in the situation The interest is responsible for the persistency of the conation In the early stages man's interests are instinctive With mental development they are acquired and then it is they that lend the necessary force to his conations. The acquired interests arise out of sentiments for objects and ideas, and then finally out of the self-regarding sentiment.

McDougall has employed an admirable illustration with the help of which he has analyzed how

interest, in the case of man, generates and keeps up conation. There are three individuals A., B., and C. travelling in a car. A. owns the car and is at the wheel. B. and C. are his friends accompanying him. B. knows something about automobiles, and can drive the car. C. does not know even that. The interests of A., B., and C. in the car and its doings obviously correspond respectively to their relationships with it just mentioned. Suppose as the car moves along, it begins to make some sound in one of the wheels, the sound not being loud enough to be startling. A. notices it at once, and begins to try to find out what it is due to B. fails to notice the irregularity, and so does C. A. draws the attention of his friends to the matter. B. used to driving the car hears a particular sound, and begins to take interest in the solution of the problem regarding the nature of the source of trouble, and how to remedy it. C. does not notice the sound even then, and when repeatedly pointed out perhaps hears it. The process may require a little tuition at the moment by A. or B. C. neither makes an active effort to discriminate the sound nor to solve the problem until, perhaps, he is frightened by his companions as to the chance of the car coming to a standstill. However, A., B. and C all pursue the problem and attend to it to the best of their ability. Their conations, just in so far as attending to it are concerned, are governed by their relative interest, in other words by what the solution of the problem means to each individual. To A. it means much more than to B. or C. The machine is his, and he has to drive it. To B there is more interest than

there is to C in view of his reputation as someone who knows how to drive a car

Interest thus means, that which 'means or matters.' It is therefore that enduring mental system which sustains conation and continues the activity called attention The interest not only makes us ready to pay attention to a situation, but sustains our activity towards the situation till the object is achieved "Interest is latent attention, and attention is interest in action The essential condition of both interest in and attention to any object is that the mind shall be so organised, either natively or through experience, that it can think of the object, and that such thinking shall evoke some impulse or desire which maintains a train of activity in relation to the object"[1]

In the sense in which we have been using attention, and the interest which lies behind it, we have emphasized the conative rather than the cognitive side of the mental activity The interest gives the drive to the attention According to Drever, interest is "a disposition in its dynamic aspect". The intensity with which the interest controls the dynamism and regulates it depends upon the conative tendencies excited Interest does not depend particularly upon knowledge or cognitive systems The presence of cognitive systems or knowledge of an object does not alone sustain our attention towards it There must be some impulsion, and that should be constant and continuous if attention has to be sustained.

[1] McDougall *An Outline of Psychology*, page 277

Types of Attention

We return now to examine the various ways in which the selective activity operates, and with what kinds of forces it is sustained in each case We have emphasized the fact that the forces which determine attention and sustain it are, really speaking, all subjective While the distinction between objective and subjective attention is not ultimate, we may for educational purposes recognize the fact that objects capable of starting intense and sudden sensation distract the child, and make him attend to them. The impulses of curiosity and unbalanced fear are so great in the child that, whenever these objective conditions arise, he is liable to be drawn by them, and consequently attend to them. Only when essential, general use is to be made of exciting objects for attracting the attention of the child On the other hand, the child is to be trained, through the cultivation of right interests, not to be alarmed by these extraneous conditions.

Assuming all attention to be of subjective type, we have to notice certain varieties of it depending on the nature of interests which sustain the attention activity. We have native urges within us which are responsible for our attention to certain specific objects or situations We attend to the natural objects of our interests. A small moving object, *e.g.*, a ball rolling on the ground interests a kitten particularly, because it is related to its hunting and playing tendency, and so it attends to it. The human baby in a hungry state attends to objects of food and those related to it—

may be the feeding bottle or some such thing As instincts are modified and interests are acquired the human being attends to objects related to these—the home, the relations, the profession, and on top of all his own self and his ideals

Some of the objects, whether related to native or acquired interests, are of absolute direct interest to the individual, *e g*, the food articles, toys, home, relations, and friends. The interest in such cases directs the attention without any drain of mental energy. A student in attending to a football match is guided by an interest which does not require any extra drain of mental energy to sustain the attention The object is an object of direct interest But when he has to attend to a knotty point in one of his mathematics lessons the position is different While mathematics or school work does matter to him, and consequently is backed by an enduring mental system, the interest in the task in hand is indirect In order that attention may be fully directed and sustained in such a circumstance, there is a drain of mental energy in the act of conation The necessary mental energy may be supplied by the will; in other words, by the self-regarding sentiment. The degree of mental energy expended will depend on the extent to which transference of interests has taken place One of the tasks of efficient teaching is to ensure this transfer

That type of attention where the interest is direct, and where the organism backed by this interest carries on the conative activity spontaneously, has been called non-voluntary or spontaneous, that where the interest

is indirect, and where the organism by this interest is constrained to carry on the conative activity under the influence of will has been called voluntary attention. In some of our common acts there is often a struggle between these two types of interests, and consequently there is constant fluctuation of attention. Whenever there are two activities, one play and the other work (*e.g.*, a cinema show on one side and writing an essay on the other) there is always a conflict of interests. More often than not the direct interest has its way, but when suitable sentiments have been formed there is a great chance of attention being directed to the object of indirect interest.

The volitional attention as its name signifies, in order to be sustained, is backed by the will-power. Sometimes only "one act of will"[1] is quite enough to let the conation proceed smoothly. In a conflict, the decision once taken, stands. At other times reinforcement is needed again and again. There is a series of conflicts, and "repeated acts of will" are required to let the conation get along. The decision to read an abstract book in preference to a novel, may require just one act of will or repeated acts of the same, according to different circumstances. The more abiding the acquired interests and the more stable the sentiment for self, the fewer will be the jerks of will needed to sustain the attention.

Attention sustained by instinct-interest is pure and simple spontaneous, and requires no expense of mental energy for its maintenance. That which is

[1] See Ross *Groundwork of Educational Psychology*, page 175.

sustained by sentiment-interest is largely spontaneous, and consequently non-volitional. Sentiments differ in degree in so far as they represent different levels of psychical integration Sentiments for concrete objects, men and things, sustain attention of the spontaneous type. But when attention, backed by sentiments for virtues and abstract conceptions, has to be maintained in certain situations, some act of will is required. And this attention may be called volitional of the lower order. That of the highest order is the one in which the self-regarding sentiment alone plays the dominant role To summarize the general point of view regarding the classification of attention the following table is given:—

ATTENTION

- Objective (determined by objective conditions) Distinction ultimately not quite acceptable
- Subjective (determined by conditions which arise from within the subject)
  - Spontaneous or non volitional Sustained by direct interest
    - Primitive attention (arising from instinct-interest)
    - Acquired attention arising from concreto sentiment-interest)
  - Wilful or volitional Sustained by indirect interest (May require one or repeated acts of will)
    - sentiment interest) educated attention (arising from abstract sentiment interest)
    - Acquired and highly-educated attention (arising from self-regarding sentiment-interest)

Attention in School

The problem of attention has been one of the foremost problems of school work Almost every one who sees any fault in class-room work is apt to remark that the trouble is due to the fact that children are not attentive, that their attention must be secured before work can go on 'Get the attention of the class' is thus the preliminary instruction for the new teacher. Now, from what we have been saying about attention and interest, it should be clear that the problem of attention, while it is of primary importance, is not the direct problem. The direct problem is the problem of interest. Instead of 'get the attention of the class', the fundamental instruction is to be 'get the interest of the class'. And this interest is to be interpreted in the sense in which we have been treating it in this chapter. Attention emphasizes the conative aspect of the mental experience during an activity. The conative activity is and can be sustained only by a system of enduring interests—interests which can evoke the necessary impulse. If the presence of that which evokes the necessary impulse is ensured, there is no reason why conation should not proceed smoothly.

Children's interest in the work is secured ordinarily by the introduction of concrete objects, illustrations, and by adopting means and methods related to their instincts and tendencies. Pictures, concrete objects, playthings, models, etc , are employed from time to time to excite the interest and secure the attention of the class. This kind of interest is only primitive, and while it has

an undisputed place at a certain stage of education, and during certain steps of particular lessons at all stages, it is not what constitutes interest, in the sense in which we have been advocating it Such a procedure, if carried too far, makes our principles definitely open to criticism Modern pedagogics with all its concrete methodology is scoffed at by the school which believes in the hardening process for the child, and which has its own peculiar notions of the will-power. While our line of criticism would be different, all the same the criticism of soft pedagogics would seem to hold ground. We have, however, said enough and repeatedly in favour of concrete methods to be misunderstood The purchase on the child is to be got by taking advantage of the instincts, but the whole work is not to end by catering for them alone

When we advocate the procedure of making the child interested in the work we do not mean catering for his primitive needs, but we mean slowly and gradually to build up in his mind such systems and dispositions as would help him to obtain from them the necessary impulse for applying himself to the useful tasks of school and later of life, in a way as would indicate that the task 'means or matters' something to him. The whole task of education has to concentrate itself upon building up these mental systems of interests in children

Spontaneous attention can easily be secured by appealing to primitive interests. For giving attention to tasks not related to primitive interests the will-power has to be exercised, and so often for the boy repeated acts

of will are needed (for carrying on his various studies and intellectual tasks), which means a considerable drain of mental energy. It is the work of education to minimize, if not altogether to eliminate (that would be rank idealism) this drain of mental energy. With the formation of strong acquired interest for the intellectual tasks, in other words, with the formation of sentiments for the studies, there will be gradual transfer from the volitional to the spontaneous type of attention. How this formation of interests is to take place, we have already discussed. We cannot, however deny that even when much of this is achieved, occasions for the exercise of voluntary attention, and perhaps of the highest degree, will remain. But these after all are occasions which act as sieves for sorting out the highly integrated minds from the average ones.

Experimental Psychology of Attention

Having discussed the nature of attention and its relation to interest we shall now consider the findings of experimental psychology as have thrown light on the various aspects of the process of attention.

I. *Span of Attention*—This means finding out how many things can exist in the focus of consciousness at one time. The layman's point of view is clear, in so far as he believes that only one thing can be kept in focus at a time. It has been found as a result of experiments that the number of items which an adult can apprehend at one time is four to five *e.g.*, if a number of dots, or letters or figures are just flashed for a short time before a subject, and he is asked to tell how many he has

observed, it has been found that he can apprehend them correctly up to five

The time for which the items are to be exposed is to be very short, 'ranging from 1/100th to 1/5th of a second' It is to be so short that the subject is unable to move the eye and count, but it should be just enough to let the eye accommodate itself and make the subject perceive the situation. So far as the objects are concerned they may be simple like dots or letters, or they may be complex like triangles or words, etc. The mind perceives the object as a whole, and so long as no demand is made on the part of the subject to make explicit the whole which he has perceived, there is no harm in using complex objects Whatever the nature of objects, it is "only five separate units that can be analysed from the experience resulting from a very brief act of attention"[1]

The objects in the experiment mentioned are apprehended with the help of visual sensation. They give a measure of the span of visual attention With proper stimuli it is possible to measure the span of auditory attention as well Sounds from the beats of a metronome or other sounding apparatus may be given It has been found that an adult subject can apprehend eight sounds given rapidly in succession "When the metronome taps succeed one another every quarter of a second, the subject can just apprehend groups of eight. If one group (the first member of which is accented by a bell) consists of eight taps, while

[1] Myers *Text-book of Experimental Psychology,* page 322.

another group (similarly accented) consists of seven taps the subject can, without counting distinguish the one group from the other, but beyond groups of eight taps, his judgments are unreliable."[1]

Any apprehension which will be found to increase with age, education, experience, and practice in experiments will not be in the direction of increase of span. The improvement will be in the nature of items apprehended. With increasing practice objects of a more complex nature will be apprehended. This brings us to one of the well known laws of cognition enunciated by Spearman. His 'law of constant output' says, "every mind tends to keep its total simultaneous cognitive output constant in quantity, however varying in quality."[2] A simple fact that only five marbles or beans could be seen simultaneously was noticed by Bonnet, and later experiments have shown that the same position holds when items change from marbles to dots, or letters, or lines, etc. Now, according to Spearman, there is one constant limited sum total of mental energy. It can neither be increased nor decreased It can, however, be utilized in varying manifestations of mental activity. When at a particular moment it is expended in attending to five items, none is left to be expended in any other direction. The span of attention is thus limited

II. *Fluctuation of Attention*—We have seen that the number of items to which we can attend at

[1] MYERS · *op cit*, page 322

[2] SPEARMAN · *Nature of Intelligence and the Principles of Cognition* page 131.

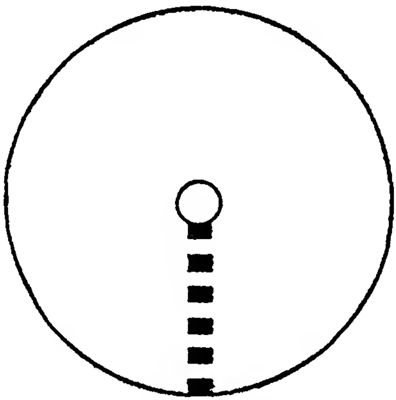
one time is limited. But having apprehended an item, the question arises as to how long the attention over the object lasts at one stretch The question may be asked—after how long a time does the attention fluctuate from it? The ordinary belief is that we can maintain a certain object in the focus of our consciousness for a very long time The belief arises out of the fact, that we find that we can study for hours at a stretch one particular book or subject of study Experimental investigation as revealed the fact that this popular belief is incorrect In the so-called continued attention, there is constant fluctuation going on, but conation proceeds steadily.

In order to measure this fluctuation quantitatively very weak stimuli[1] are employed. A simple experiment can be performed with the ticking of a watch The experiment is to be carried on in a very quiet room. The subject is seated at a certain place, and the watch is gradually moved away from him up to a distance whence he can just hear the ticks Any further moving beyond this distance makes them inaudible. By a series of trials the proper distance can be found The subject is asked to attend to the sound. Any one can easily notice that the sound of the ticking comes and goes The alternation of appearance and disappearance of sound indicates the fluctuation The subject may be asked to indicate this by some suitable mechanical device in which the loss of time is at a minimum. It has been found that the attention fluctuates after every

[1] See COLLINS AND DREVER *Experimental Psychology* page 142

5 or 6 seconds. The time varies with different individuals. The shortest time of fluctuation observed in experiments is 3 seconds and the longest 25 seconds.

A more accurate and reliable experiment can be performed with the help of a Masson disc shown in the figure given below:—



("The diameter of the disc should be 20 cms. The black line should be 5 mms. broad, the interrupted black pieces 5 mms. in length, and the white spaces between also 5 mms. in length."[1]) The disc is rotated with a sufficient speed in front of the subject. As the disc is rotated the black pieces give the appearance of grey rings. The rings nearer the centre are greyer but those at the edge appear whiter. The subject fixes his eye on the least grey ring. The ring can be distinguished when he attends, it cannot be when his attention fluctuates. There is a bulb which the subject holds in his hand and presses when the fluctu-

[1] COLLINS AND DREVER: *op cit*, page 142

ation takes place The bulb manipulates a lever which is connected suitably with a smoked drum on which records are made This experiment also yields the results mentioned before

Prolonged breaks of attention are a serious handicap to any intellectual task, but such fluctuations as are characteristic of a normal human mind do not interfere with mental efficiency Prolonged breaks of attention are obviously connected with flight of interest from the work in hand to other matters. This must be controlled by the formation of sound interests and repeated acts of volition

III *Division of Attention.*—It is claimed with pride by certain individuals that they can carry on two tasks simultaneously Some have reported even more being done by great persons And hence the question—'how many tasks can be attended to at a time?'—has been subjected to experimental investigation It is needless to point out, that in discussing his question we leave out of consideration the case, when the two or three tasks simultaneously being carried on are automatic or mechanical, *e g*, tapping with both hands, or doing something similar When one of the two activities happens to be quite automatic, and the other one requires attention, the question again does not arise, *e g*, talking while cycling, or dictating while knitting, etc In such cases the question becomes worth considering when something goes wrong with the mechanical activity and attenton is needed by it as well, as when there is obstruction in working the cycle or moving the knitting needles The position

is really worth considering when two tasks, both requiring attention, *e.g.*, reading a book silently and dictating a letter, are carried on simultaneously.

The problem has been studied with the help of a simple experiment. Two tasks are first given separately for a certain amount of time, and the performance of the subject noted in each Then the two are given to be done simultaneously, and the performance noted again The subject may first be told to write down the alphabet series over and over again for one minute, and the total number of letters written noted. Then he may be given a little oral arithmetical work to do, *e g.*, speaking aloud the series which is formed by addition 1 to 5, 6, 11, 16, 21, etc , for the minute The total number of numbers in the series is counted. After this both these operations (writing of letters and oral arithmetic) may be performed simultaneously for one minute, and the amount of work done recorded It has been found that in this simultaneous work, the workmanship is very bad.

Introspections of the subject reveal, that at one time the subject attends to one piece of work mainly, and at another to the other. That which is attended to particularly is done well, while the other suffers. What actually happens is that the attention of the subject oscillates from one to the other. The oscillation is natural in view of the fact that the subject desires to score well in both. In the interest of the self he is spurred again and again. If one of the processes, as we said before, becomes habitual, then it would require no drain of mental energy. The energy

will be available for the other work requiring attention.

Oscillation is one more evidence of the fact that Spearman's law of constant output operates The power of quick oscillation is great in some people. Their fund of mental energy may be considerable, and combined with this rapid oscillation accounts for their extraordinary performances It is after all a gift of native abilities It is worth noting that so often while writing we are able to overhear what people in the adjoining room or sitting nearby are talking about, and grasp the general sense of the conversation We may even pass a remark or two by way of comment, and continue writing.

McDougall explains the situation in terms of the "persistency of conation to reach its goal" The conative activity once having received the impulse gets going, and "continues in some degree to operate after we cease to think of the goal". McDougall very aptly remarks that, "conation outlasts the cognition which initiates it"[1] When we are writing the pen flows on, and sometimes words that are to come in their proper sequence are written automatically while the mind thinks of other ideas Sometimes we may write some incorrect or discarded word just because the conation towards writing it had started Conation does not come to a standstill at once, but it goes on although we begin to cognize something else

[1] McDougall *An Outline of Psychology*, page 282

In justification of his view that 'conation outlasts cognition,' McDougall cites some examples from the experiences of everyday life "We find ourselves walking round some spot, opening a drawer or desk or standing before a table, and aware that we have come with some purpose; and yet we cannot recover, cannot rethink, the goal we had in view." When we carry on two activities A and B simultaneously, attention oscillates between A and B. Now, while the mind during the interval of oscillation passes on from the given-up to the taken-up, the execution of the activity which is given up continues for a short while.

IV. *Distraction*—When we are at work and something else goes on in our surrounding we are sometimes distracted, mostly owing to the arousal of our primitive interests. If, when we are doing some intellectual work, some music or play is going on, we are liable to be distracted. The effects of distraction are apparently harmful, and efficiency suffers. In school work distraction is an important factor because children are more liable to it owing to the strength of primitive interests.

Distraction has also been subjected to experimental investigation, and in certain cases the results obtained are found to be different from the popular opinion about the matter. To determine the effect of distraction, a simple experiment is performed The subject is asked to cross out all a's or e's or any other letter over a printed page or two for a certain amount of time quite undisturbed, and a record made of his

performance. Then the same type of task is given to him to do for the same amount of time, but this time while he is at work he is disturbed by some means, say by making noises with claxon horn, or by the administration of mild electric shocks A record of the performance is made again.

According to popular opinion there should be a fall in the efficiency in the latter case, and this view is substantiated by the results of some of the experiments. But, in a number of cases (and this is quite significant), there is a distinct improvement in the performance The reason is not far to seek. When distracted the individual is spurred on, and tries to rise to the occasion If the self-regardng sentiment is strong, he struggles against the distraction and produces good results Drever discusses the phenomenon of 'dynamo-genesis,'[1] and regards this as analogous to the same

Individual differ so far as the influence of distraction is concerned Some get a definite incentive to work The author has a friend who, when he does the most difficult intellectual work, gets the gramophone or radio going to receive constant inspiration The degree of distraction is again important When the distraction is physically violent, or at any rate such as the reserve mental energy cannot cope with, it has the upper hand. It is needless to say, that in all

[1] If a shock is given to the knee it gives a reflex jerk Now, if at the time when the shock is given, a strong beam of light is made to fall on the eye of the subject, instead of the jerk being less, the reflex jerk is much more vigorous than without this beam of light

cases of getting over distraction, there is a drain of mental energy, and a consequent fatigue. Hence the condition cannot be allowed to last long With school children there is much less rising to the occasion than in the case of adults, and distraction consequently has to be deprecated.

V. *Concentration* —Connected with distraction is the problem of concentration. It is a trait which every teacher desires to develop in his children. Concentration, according to McDougall, is to be understood in the sense of "restriction of attention". If painting be brought before us and we attend to it in a general way. without proceeding to single out the important parts and their sub-parts, without singling out the details of the colour arrangement in that whole, we shall not be said to be concentrating our attention on it When we start singling out details, what we do is to "narrow the field of our attention." This sort of restriction of attention on a certain object is called concentrating attention on that object In this sense, concentration is different from what may be called "degree or intensity of attention" Some understand it in this sense as well

Now, degree or intensity of attention depends on the purpose in hand. It is the purpose that gives the impulse, and so where purpose is weak naturally intensity is low. If we look at a painting in a general way we do not concentrate on it, but if we are impelled by the necessity of writing a comment from an artist's point of view, our intensity of attention is considerable. And, till the goal is reached the intensity

will continue, whatever the obstructions may be This power of conquering resistances and efficiently reaching the end of the purpose is what a teacher wants in his children Those individuals who possess this intensity of attention are called 'concentrators,' and they are regarded as superior to those called 'distributors' who can spread their attention, on various objects

Meumann distinguished between the two types of abilities—'concentration' and 'diffusion' of attention—and he said that these two led to the formation of two different types of mind. If an individual had the former type of capacity he was disposed towards 'learned observation and scientific mind,' but if he had the latter he tended towards 'the practical vocations of life'. The concentrative type became a thinker or a scientist, the distributive type became a businessman or an administrator, or took to the ordinary professions. Now, according to Spearman, both intensity (concentration) and extensity (diffusion) or cognitive operations are manifestations of the same mental capacity They depend on an individual's general factor '*g*' [1] The two "constitution alternative dimensions of the same constant cognitive output characterizing each individual .... Neither faculty has any real existence."[2] He has discussed the view of McQueen[3] who by a series of well designed investigations and statistical treatment of results reached the conclusion. that "there

[1] See chapter on Intelligence Testing

[2] SPEARMAN · *Abilities of Man*, page 269

[3] For McQUEEN's work see *British Journal of Psychology* Monograph Supplement, Volume V, 1917.

is no evidence whatever for the existence of an ability to concentrate attention, or inversely to diffuse it."

Very recently F. M. Earle[1] has conducted an investigation into the differences between tests which appear to measure certain aspects of distributed attention, and he points to the conclusion that, "there are no differences in the nature of attention as between its concentration and diffusion; but there are differences in the rate of the succession and in the intensity of attention necessary for the purposes of the moment. ... ..Differences between individuals may be ascribed to the fact that they are not equally able to give attention successively at the required intensity and at the required speed." Both these, *i e*, the rate and the intensity vary from task to task, depending as they do on individual tasks, influence of practice, training, and special knowledge.

References for further reading

1 McDougall . *An Outline of Psychology*, Chapter IX.

2 Stout :*Analytic Psychology*, Vol. I, Chapter VI.

3 Collins and Drever : *Experimental Psychology*, Chapter VII.

4 Spearman : *Nature of Intelligence and the Principles of Cognition*, Chapter XI.

5 Bagley : *Educative Process*, Chapter VI

6 Myress : *Text-book of Experimental Psychology*, Chapter XXV.

[1] For Earle's investigation see *British Journal Psychology*, Vol XXI, January 1931

CHAPTER IX

MEMORY, AND THE ASSOCIATION OF IDEAS

One of the fundamental characteristics of the psychical which psychologists have differentiated is 'conservation'. According to Drever, it is the characteristic of every psychical process—conscious as well as endo-psychic—that, "it leaves behind it a permanent product in the shape of a modification of structure in the organism itself." This means that every psychical process leaves some engram-complexes and these are conserved in the mental structure of the individual In general, no impression is lost, but in some way or the other influences the disposition of the individual. Conservation, thus, involves the retention of all our past experiences and includes memory, which helps us in remembering and reproducing what we have experienced. ...

In conservation; the engram-complexes join the existing mental structure, and thus bring about a change in the existing conditions. The question naturally arises as to whether these impressions, when they enter the mind, are received by the existing structures in a particular way, or whether they thrust themselves in anyhow Again, do all the engram-complexes systematize themselves, or lie about in a haphazard way in the mind? There is perfect organization and definite system, both as regards entry and as regards conservation This systematization is

governed by another fundamental characteristic of the psychical, which Drever calls 'cohesion'. It is because of cohesion that the conserved elements do not form "a mere mass or aggregate, but an organized whole; here and there, it may be, very highly organized". The traces which the psychical processes leave behind are not conserved as isolated items but as systematic groups. We shall first examine the nature of cohesion because it systematizes conservation and aids reproduction of experiences.

Association

The phenomenon of co-hesion was for a long time called 'association', and the use of that term even now would not be wrong if it is employed in a sense which is clear and definite. The association of ideas is a well-known principle by which one idea tends to be connected with another owing to certain specific relationship In this sense, it means the process by which the systematization of conserved elements takes place Unfortunately the word association has been associated with a school of psychology (extinct now) which was called 'associationism'. Associationism represented a school of thought which tried to explain all mental phenomena on the basis of one fundamental principle which was called association The term was consequently used in a much wider sense than now. The British associationists—Hartley, Brown, Mill, Spencer, etc, all adopted the same point of view, each in his own way. They explained perception, conception,

reasoning, imagination etc, all on the basis of a principle of the connection of ideas and thoughts in the mind, which was called association There is no need to discuss a theory, long given-up, but we should like to emphasize the fact that association now is used in a very restricted sense.

Our ordinary experience tells us that experiences tend to reproduce themselves by virtue of their association An experience A, which has been associated with B, in some way or another, tends to reproduce itself when B is recalled, and *vice versa* Suppose we met a friend in the street, and this friend at the time happened to be driving a red-coloured "Baby Austin". Now, on a later occasion, if the recurrence of meeting the friend takes place in the mind, it is quite possible that the idea of the red "Baby Austin" in which the friend was seated may reproduce itself If some one asks why the idea of the car comes before the mind when the friend is recalled, we say that is because the two were associated together Association may take place in a number of ways, and connections between two items may be established in various contexts We shall presently consider these forms of connections which have been termed the laws of association

It is again a matter of experience, that if the association is weak there are less chances of the associated elements reproducing themselves, and if the reproduction does take place, it is rather vague and indefinite On the other hand, if the association is strong the reproduction of the associated element

generally takes place and tends to be clear and definite Often, when we are trying to reproduce a certain experience, we find that our reproduction is accompanied by certain images of the past original experience When we begin recalling our friend and the conversation we had with him on the road, what we find is, that the picture of him sitting in his car at the wheel, comes before us This picture resembles the original one as nearly as possible It is sometimes very clear before our mind's eye, at other times it is vague It all depends on the vividness of our past experience and on the firmness with which it has been conserved in our mind. But we do have pictures of the past before our mind's eye

Images and Imagery

Pictures or images are altogether mental. It should be clear that at the time when we have images, we do not have any sensory experience in connection with the representations which we have before our mind When we have the actual sensory experience and a consequent mental apprehension of the same, we really have a percept before our mind. In the case of the image, although we apprehend the object mentally, this apprehension is not determined by the sensory experience of the moment as in the case of sense perception. We resort to imagery or pictorial representation.

These pictures or images which represent the original may be of various types. In the particular experience which we cited before the picture which comes

before the mind is visual, hence it is called a visual image Quite a number of our images are visual We get before our mind's eye the picture of a building we have visited, the room in which we have sat, the friend to whom we have talked and so on Now, if we try to reproduce in imagination the sound of the college bell or the barking of dogs, and have before our mind's ear the sound 'ding-dong', 'ding-dong', or 'bow-vow', 'bow-vow', we have an auditory image. In general, we can have images corresponding to each sense-organ through which we obtain the original perceptual experience.

We may have visual images, auditory images tactual images, oilfactory images, taste images, temperature images, and pain images It is easy to experience the touch image of a blanket, or velvet, the taste image of sugar, or lemon, the pain image of toothache, or stomachache, the small image of coal-tar, or rose, etc. Visual and auditory images are common and more easily recalled compared with others. Individuals differ in their powers of imagery and are classified as audiles, visiles, mitiles, etc , as the case may be

Simple experiments may be performed to determine the type of imagery in which an individual is particularly strong Also two individuals can be compared with one another for the same type of imagery The subjects may be asked to write down the names of objects of a certain colour, say green (grass, leaves, etc.) for a period of two minutes or so Then they may be asked to write down the names of the objects that feel rough (sand paper, etc), for the same period of two minutes. They

may also be asked to write the names of sounds of a certain type for the same time, and so on. A comparison of their performance would give an idea of their individual trend. Besides these experiments some questions of the following type may be asked in order to have some idea of the individual's control of imagery:—"(a) Close the eyes and get a visual image of a line Can you increase or diminish its length at will? (b) Visualize a plain square. Can you picture it red, green, black at will? (c) Can you think of a friend, (or scene) without having a visual image of him (or it)?"[1]

Laws of Association

We shall now consider the various conditions and factors which facilitate the formation of associations These have been called the laws of association for a long time. In recent times there has been a tendency to supersede the title 'laws' Dynamic psychologists prefer to call these 'forms' of association, rather than laws of the same. Still more illuminating an expression that has been used is the 'tendency' to form association. As regards these laws of association, there is considerable difference of opinion between psychologists as to how many should be regarded primary and fundamental. Again the laws have been stated in varying terms as well. We shall mention some of those about which there is a fair amount of unanimity of opinion Some of these are more or less general statements made

[1] For more questions of this type see VALLENTINE'S *An Introduction to Experimental Psychology*, pages 9-10

in varied terms, which express certain conditions that are helpful in recalling experiences. These general statements, have by some psychologists, been called secondary laws.

Two laws have been recognized as fundamental for a long time. These are the laws of 'contiguity', and 'similarity' According to the law of contiguity, "experiences which are contiguous to one another in time tend to be associated together so that the first tends to recall the second" We meet a friend A, and soon after come across another, B Then the recollection of A on a future occasion tends to recall B, as well The contiguity in time may be in either of the two directions The experiences may be contemporary or they may be successive Experiences which happen together, or which closely follow one another, tend to cohere and form an association. The law of similarity says, "similar experiences tend to be associated so that the one recalls the other" We are often reminded of an object seen sometime back, when we have in the focus of our consciousness another object similar to the former It should also be taken note of, that contrast operates in the same way, but not so often, as similarity in making the elements cohere A separate law called the law of contrast need not be enunciated.

Similarity has been regarded as an independent form of association by some psychologists *e g*, Stout. Others, *e g*, Drever, regard it as of doubtful validity. The law of similarity may be regarded as "a particular case of the operation of the first law." They prefer to

speak of a law of systemic relations—"our experiences. on the basis of continuity of interest, and the unity and continuity of the attention process, determined by interest, tend to form wholes or systems The result is that associative bonds are established between the wholes and their constituent elements, between the constituent elements and one another, and between the constituent elements and the whole."[1] Such a law "is operative in the case of our higher thought processes"

As regards the general conditions indicating the tendency to the formation of association bonds, and consequently aiding reproduction, the following may be recognized:—recency, frequency, primacy, vividness or intensity of interest They are enunciated in simple terms The law of recency is,—'one idea tends to recall another with which it has been most recently associated.' The word 'book' may suggest to the mind the name of the particular book that we may have read or thought about most recently. The law of frequency is,—'one idea tends to recall another with which it has been most frequently associated in the past.' 'Grass' is green, and it is most frequently seen, naturally the first object having green colour which may occur to the mind is 'grass.' The law of primacy is,—'first impressions and associations tend to persist long, and are easily revived.' Some of the first impressions that we have about our acquaintances tend to stick rather firmly, and are easily recalled. The law of vividness is,—'the more vivid an

[1] COLLINS AND DREVER: *Experimental Psychology*, page 215

impression or association, the more enduring is its influence, and the more easily is it recalled' We may have had only one interview with a great man, but all the details of that conversation are vivid and easily recalled Frequency contributes to vividness, but the latter as a factor is operative independently. The law of intensity of interest may be said to be the same as that of vividness Fundamentally there is no difference between the two Subjectively it is the intensity of interest that is responsible for vividness It is because of intense emotion that the interview with a great personage is so vivid and easily recalled The nature of revival is determined by the operation of one or more of these laws or forms of association. In most cases it is a number of them that operate and bring about revival

The nature of associations can be studied with the help of simple experimental devices in which word stimuli are given, and the responses of the subject carefully interpreted and scrutinized in view of his introspection The subject is given a certain word as stimulus, and is then asked to respond to it by giving another word that occurs to him Two methods—the 'serial method,' and the 'reaction method' are mostly employed In the serial method, a word, *e g*. 'book' is given and the subject responds to it by any other word which first strikes his mind, *e g*, 'table' The subject writes down 'table,' and then another word suggested immediately by the word 'table,' and then another suggested by the next response word. A series is thus got ready, the experimenter's stimulus being the first word only which starts off the series. In the reaction method, which is

more often employed than the serial, a word is exposed or orally given by way of stimulus to the subject, and he is asked to respond by the first word that occurs to him, and note it down. Then another fresh word is given, and the subject asked to respond to it as before A list of suitable words is prepared by the experimenter and given out. The list should have a good variety suited to excite the response of the subject in various contexts, *e.g.*, book, green, river, blood, ball, sadness, psychologist, doctor, murder, college, wisdom, etc.

The introspections of the subject will reveal the operation of the various laws which we just discussed Apart from the operation of the various laws, we may emphasize the influence of the general trend of the mental activity at the time of recall, which Stout enunciates thus:—"Those objects tend to be ideally re-instated which are relevant to the general trend of mental activity at the moment of recall. If our minds are occupied with scientific discussion, the word 'proofs' will suggest one group of ideas; if we are engaged in preparing a book for the press, it will suggest something quite different."[1]

Various investigations have been made with word associations. In the experiments mentioned above, the subject is allowed to respond freely with any word that may suggest itself to him. In other experiments the association may not be allowed to be free, but be constrained by asking the subject to respond in a particular way, *e.g*, when 'book' is given by way of

[1] STOUT: *A Manual of Psychology*, page 565.

stimulus the subject may be asked to give the name of any book that he may have read Such an instruction restricts the field of response The field may be restricted to various degrees, *e.g.*, an instruction like 'name any book on psychology that you may have read' narrows the field further. Again, in association experiments the time of the reaction may be recorded by a properly constructed chronoscope Often, when there is hesitation or emotional struggle going on in the mind of the subject, the reaction may be considerably delayed. As we mentioned in one of the previous chapters, the psychoanalysts have made great use of the word-association method for the study of the mental pathology of individuals, through an analysis of the nature of associations and the times of reaction

Conservation

All psychical activity leaves behind some impressions which are conserved in our mind What is the nature of this conservation? As we said before, conservation involves retention of past experience. A certain event occurs, and is retained in the mind. Now, what is it exactly that is retained? Is it the experience as such that is retained, or does it leave behind something else? Every experience, whatever it be, is a passing event It is a mental function. The experience when it occurs brings about some modification in the mental structure, just as a knife edge leaves a mark on the table when it passes over it. After the event of scratching is over it is only the mark that

remains. In the same way, the mental event having passed away leaves behind some engram-complexes, and these are conserved.

Ideas, percepts, events come and go, what they leave behind is only a disposition. When, later, there is revival, the disposition is stirred as it were, and the past experience is recalled. This is not the past experience as such, but another experience which bears all similarity to it. Every particular experience takes place once and passes away And here we will emphasize again what we said in connection with a percept The second percept of the very same object is different from the first, however similar to it The original experience is one event, its recollection however similar, is another. "A percept is an event; the memory of it is a new event. What is retained or conserved is the product of the conscious process in the shape of a permanent modification of the living organism, it is disposition, not experience."[1]

Spearman's law of retention clearly emphasizes the same view. His law is, "that cognitive events by occurring establish dispositions which facilitate their recurrence"[2] To start with he says that conservation helps reproduction, rather, the latter depends upon the former. Then, as regards what is conserved he brings out the same point of view which we have discussed in the previous paragraph The cognitive events establish dispositions Thus, what they leave

[1] DREVER: *An Introduction to the Psychology of Education*, page 28.
[2] SPEARMAN: *Abilities of Man*, page 271.

beind are dispositions and not themselves. It is the dispositions which are conserved, and not the experiences themselves as such

Professor Edgell has laid stress on the fact that 'retentiveness,' or what we have called conservation, "is involved in the very conception of mental life" When we turn over the pages of a book, which we have read partly, with a view to find out where exactly we left off reading, we find that as we go along there is a feeling of familiarity which strikes us when we repeat the portions which we may have already read. This sense of familiarity is a strong evidence of conservation Again since the re-learning of material that is forgotten takes much less time and fewer repetitions than the first learning, we are led to believe that some conservation of the impressions obviously takes place

Laws of Memory

Three laws of memory, *i e*, conditions which facilitate revival of past experience, may be recognized. They are,—the law of perseveration, the law of association, and the law of habit

I. *The Law of Perseveration.*—Any experience which is particularly vivid persists for a short time in a state of sub-arousal after it is over The time varies with the nature of experience, its degree of vividness, and the meaning that the experience has for the individual The experience spontaneously tends to reproduce itself again and again After we have heard a good piece of music the tune keeps running into our

heads although the music stops. Sometimes it so happens that the perseveration goes on in spite of ourselves. This phenomenon is particularly noticeable in connection with certain thoughts and ideas which persistently come and disturb us again and again when we desire to sleep. The condition is aggravated when there is mental fatigue, and when we want our mind to be absolutely free from any of these memory images. Under ordinary conditions perseveration is most generally noticed soon after the original experience has occurred A striking painting or photograph tries to re-present itself again and again before the mind's eye

II. *Law of Association*—"Experiences tend to reproduce themselves by virtue of their association"[1] If any event A, has been associated with B, in any of the forms which we have already discussed, then the revival of A, tends to reproduce B, or *vice versa*. The stronger the association the greater is the possibility of reproduction.

Spearman does not regard the law of association as a fundamental law of memory. He enunciates the law of retention mentioned before, *viz.*, 'cognitive events by occurring establish dispositions which facilitate their recurrence'. Associative connections, whatever they may be, do not explain the process of reproduction According to Spearman, it is the law of constant output ('every mind tends to keep its total output constant in quantity however varying in quality') which accounts for "the ideas being produced in consciousness at all"[2];

[1] MYERS: *Experimental Psychology,* Volume I, page 136
[2] SPEARMAN: *op cit*, page 271

the law of associaton merely helping us to understand why the reproduction is of one kind or another. It simply tells us why an item of a certain kind has come in and not another Why any item has been reproduced at all, is not explained by it The reproduction as a mental process requires some output of mental energy which follows the law of constant output. What shape the reproduction assumes is explained by association Memory is nothing but one of the ways in which the constant fund of mental energy exhibits its flow.

The Gestalts have raised another fundamental point concerning association, which may be discussed Is it necessary that two perceptions merely by occurring together or in close succession should become associated? We may meet a friend A, and his son B, together. But it is not necessary that we should recall the son B, whenever we see the person A, much less any of the other things in the vicinity of, or with A, that we may have seen, *e g.,* his walking stick, or his hat, or the trees by the roadside where we met him We say that if these are covered by the conditions which we have discussed before we may recall them, otherwise not. Now, according to Gestalts, those conditions are based upon "an erroneous assumption that each of the associated acts, perceptions, ideas, qualities, or what not has and maintains an independent existence after as well as before they are connected," and a certain kind of glue called association joins them. The nature of this glue has baffled both psychologists and physiologists

According to the Gestalt conception the law of association would be, "whenever a number of more

or less discrete perceptions (or ideas) enter ino a configuration, they become joined by virtue of their membership in a whole; the members are thereafter held together, not by the external agency of an associative 'glue,' but by the transformation which they have undergone in losing something of their individuality and becoming the members of a single pattern".[1] If A, and his son B, have a membership character of being father and son during our perception of them, then later, if we view any one member A, or B, under the same pattern (father and son), A, would tend to recall B, and *vice versa*. Critically examined the essence of this point of view is included in the 'law of systemic relations' mentioned before.

III *Law of Habit*—Owing to the operation of perseveration and association vivid experiences remain in the mind, and tend to reproduce themselves The same cannot be said of experiences which are neither vivid nor have any element of interest in them Such experiences are stamped on the mind by sheer practice and repetition, and are consequently reproduced Nonsense syllables, meaningless words, tables, and figures are committed to memory on the basis of this law Association sometimes helps the memorization process, but even without association mere verbal repetition is quite sufficient for purposes of the operation of this law. It refers to what may be called 'rote memory.'

This brings us to the consideration of the difference between 'habit memory' and 'true memory,'—

[1] OGDEN· *Psychology and Education*, page 186

a distinction which has been pressed rather emphatically by Bergson. Memory and bodily habit have been accepted widely as identical functions, and the distinction drawn by Bergson questions such an assumption According to Bergson, habit is function of the body, and memory is a functon of the mind "The past survives under two distinct forms· firstly, in motor mechanisms, secondly, in independent recollections . The memory of a lesson remembered, in the sense of learned by heart, has all the marks of a habit . ., the memory of each successive reading has none of the marks of a habit . . ; of these two memories one is pure memory, the other is habit interpreted by memory."[1]

In dealing with the law of habit we referred to the learning of material with the help of a large number of mechanical repetitions, *e g.*, if we have to learn a table or rules of grammar we do so by producing sounds and rolling the material off our tongues We thus emphasize the mechanical aspect of the process of memorization. In the case of the operation of the law of association the material to be memorized may not require any repetitions It is quite possible that we may retain the memory of something which is very vivid by having seen it occur once only Now, ordinarily, we believe that both these memories, one of the vivid event and the other of the nonsense syllables or meaningless words, depend on the same mental function They differ only in how they were achieved, *i e*, in their mode of origin.

[1] Bergson *Matter and Memory*, Chapter II

According to Bergson, the distinction between these two memories is not merely this but of a different nature. When we learn some material by heart by repetition, *e.g*, commit to memory a piece of poetry, we merely achieve a habit of reciting certain groups of words. In reproducing the poem we do not remember the past experience, we merely recite in the same mechanical way as perhaps a gramophone record would Knowledge of material or the understanding of it may facilitate the habit-formation In the case of a poem in a foreign language which is entirely meaningless to the memorizer, it is a case of typical habit-formation Bergson assigns 'true memory' to the soul and 'habit memory' to the body. He thus raises a metaphysical question for the acceptance of this fundamental difference

McDougall has also discussed the problem raised by Bergson, and, in order to find out whether habit and memory are identical or distinct functions, he and Miss Smith have conducted researches [1] They tested forty-one subjects in four tasks two of which were of each type. Two were such as particularly involved habit formation, the other two were devised so as to involve predominantly the exercise of true memory. The habit-formation element was minimized as much as possible It should, however, be borne in mind that in no task can only one element be made to operate to the absolute exclusion of the other. In the memory experiments, which we shall discuss later, it will be seen that despite

[1] *British Journal of Psychology*, Vol. X, 1920.

the selection of nonsense syllables and foreign language words, in which the element of association is largely eliminated, it is not altogether absent To return to McDougall's experiment, after the forty-one subjects had been tested in each type of the task, they were assigned marks indicating their proficiency in each Marks in the four tasks, say A and B (habit memory), and C and D (true memory), were tabulated, and correlations[1] calculated between each two,—A and B, B and C, B and D, A and C, A and D, and C and D Correlations between A and B, *i e*, the two habit tasks, and between C and D *i e*, the two true-memory tasks, worked out to be positive and fairly high Those between the others, *i e*, between a habit task and a memory task, were found to be low or negative This investigation tends to substantiate Bergson's view

Most authors accept Bergson's division of memory into these two types, and find such a distinction useful from the pedagogical point of view But they feel that a distinction of kind such as is drawn by him raises the psycho-physical problem Nunn, for instance, says that according to Bergson's view "mechanical association is an affair of the body, chiefly of the nervous system, while true memory is an activity of the spiritual force or entity that uses the bodily mechanism for its purposes," and this means that "mechanical association belongs to the 'corpse,' and true memory to the 'ghost'

[1] For the method of calculation of correlations, see Chapter on Intelligence Testing

in the corpse."[1] Such a view obviously separates body and mind, whereas any satisfactory solution of the psycho-physical problem should tend to bring them together.

The old pedagogical systems believed in habit memory, pure and simple. Any material, whether understood or not, had to be memorized by sheer dint of labour through verbal repetitions. The more one could do this sort of memorizing the sharper was his tool rendered. Such a procedure amounts to nothing but mechanical habit-formation It does not in any way bring about any mental improvement in the individual. On the other hand, it makes the task of learning laborious and uninteresting, and involves a great waste of time.

The modern tendency is to utilize true memory rather than habit memory for purposes of learning. Learning by heart of some material is needed in every subject, and no system of teaching can altogether eliminate it. Attempts have therefore been made to experiment upon and improve methods of learning. Methods of memorizing have been rendered more scientific. The choice of the right type of material, and the necessity of presenting it in a suitable way, have been considered important factors. In the process of learning the element of interest or meaning has been made supreme Since true memory depends on association and interest, the material to be learnt is to be meaningful to the child and understood

[1] NUNN: *Education, Its Data and First Principles*, page 45.

by him so that suitable thought links may be formed. Again, since in reproducing the material learnt the child is to revive the past experience and bring memory images before his mind, the first experiences which are given to him have to be vivid Naturally the teacher has to employ various concretee methods which facilitate the formation of these memory images

Experimental Investigations on Memory

Experiments have been performed on various matters concerning memory, and the processes of memorizing. The memory span has been determined, and various economical methods of memorizing have been compared Investigations on remembering and forgetting have also been made Some of the results of the various experiments and investigations have been found to be of distinct educational value

The material generally employed in most of the experiments consists of a series of nonsense syllables, *e g*, bac, baf, paf, del, mip, etc. The nonsense syllables are selected because they possess all the formal characteristics of a word, but are free from the influence of any pre-formed associations in the mind of the subject Moreover, in using them the uniformity of conditions for different subjects can be easily maintained. Nonsense syllables constitute in addition material of a very simple nature

Memory Span—When an individual reproduces material immediately after having learnt it in one repetition only, he employs what is known as his primary or immediate memory The amount of material which

can thus be reproduced is known as the *memory-span* of the individual in respect of the particular material. The memory span may be investigated in respect of nonsense syllables, or digits or such other material For example in a typical experiment with digits, the experimenter has at hand three lists of 3 to 12 digits (one such is given below):—

9 7 2
1 4 0 6
3 9 4 1 8
4 6 7 2 8 5
3 5 1 6 9 2 7
5 8 3 9 1 2 0 4
7 6 4 5 8 0 1 2 9
2 1 6 4 0 8 9 5 7 3
4 5 3 8 2 1 7 0 3 6 9
8 7 0 9 3 2 6 1 4 2 8 0

The experimenter instructs the subject as follows:—"I will say some numbers, when I have finished you are to repeat the number in the same order" The experimenter starts with the first number and goes on to larger numbers proceeding far enough to reach the subject's limit. The longer the series reproduced correctly by the subject, the better is his memory span

As is clear, memory span refers to one's ability to reproduce material just after learning it. There is a difference between reproducing material just after learning it, and doing the same after a certain amount of time has elapsed. In the latter case, element of forgetting enters the situation The longer the time

allowed to elapse the greater is the forgetting What its rate is, we shall presently see.

In order to differentiate between reproducibility just after learning and after a lapse of time, psychologists have drawn the distinction between immediate and permanent memory. As we have said, memory span refers to one's immediate memory. Immediate memory increases with age. It has been found that at no time does the child attain the level of the adult Immediate memory depends upon the law of perseveration The adult fixates his attention harder, and naturally perseveration becomes stronger. Meumann found that immediate memory progresses at a slow rate up to the adolescent period, *i.e.*, up to 13 years. During adolescence, *i e.*, mostly between 13 and 17 years the progress is very rapid. By the age of twenty-five years the individual attains his maximum The efficiency attained remains till general mental decay sets in The knowledge of memory span is useful in education. Drever has pointed out that a "child of seven can only remember six letters, therefore spelling a word of more than six letters may be an impossibility for the child unless it is grouped into syllables or units"

Permanent Memory.—There is a difference between reproducing material just after learning it, and doing the same after a certain amount of time has elapsed In the latter case the element of forgetting enters the situation. We shall presently study the characteristics of permanent memory. For performing experiments on permanent memory, some standard methods are commonly employed:—

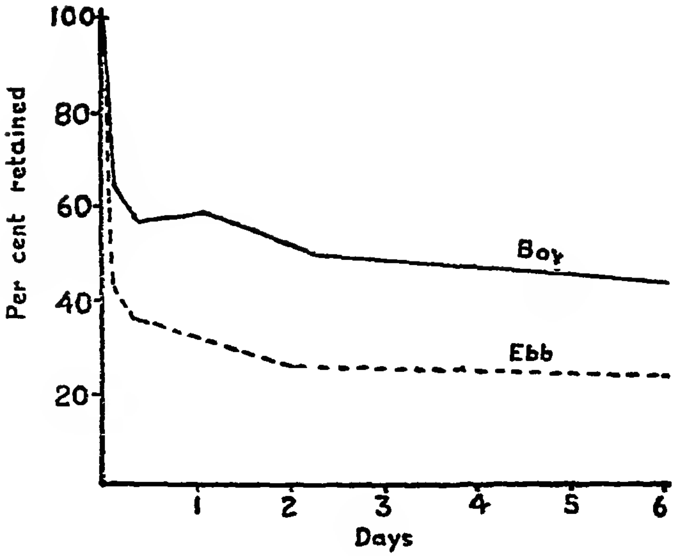
I. *Learning-and-saving Method.*—In this a series of meaningless syllables is read through by the subject at a prescribed uniform speed. This is achieved by presenting syllables through an aperture on a cylindrical drum which is made to revolve at a fixed speed Only one or two syllables, as desired, are presented at a time. The number of syllables in a series is generally eight. After every presentation or reading the subject attempts a reproduction. The number of times required for the first correct reproduction is noted. After this the saving method is introduced in the experiment. After the series is learned by the learning method, a certain interval of time is allowed to elapse. The subject is then usually unable to reproduce the whole series correctly. He is then given the opportunity of learning the series again by the learning method. The number of repetitions now needed to re-learn the series is noted. A comparison with the number of repetitions required to learn it first, shows the number of times saved in learning it a second time.

II. *The Prompting Method.*—In this the procedure for the presentation of the series is the same as in the learning-and-saving method, and the subject attempts reproduction after every presentation as before. But in this case, during reproduction, whenever the subject halts he is prompted by the experimenter giving the next syllable. The total number of times that a subject is required to be prompted until the first

correct reproduction takes place is noted. This method is employed for the learning of sensible material as well, like poetry, etc.

III *The Scoring Method.*—In this method the series is presented a certain number of times not quite enough for complete learning. When the series is presented the subject reads aloud two syllables in trochaic rhythm Thus the series is divided up into pairs and the members of each pair go together. No reproduction after every reading is demanded, but after eight or ten readings when the series is incompletely learned a short interval is allowed, and then reproduction commenced. The subject is not made to reproduce the whole series but is given the first member of each pair, and is asked to give the second member of the same pair if he remembers it. The pairs may be deranged so far as the order of the pairs is concerned, but the members of each pair must be kept in their proper positions. The number of correct reproductions constitutes the score.

Remembering and Forgetting—We just referred to forgetting which made permanent memory different from the immediate one Some significant results have been obtained from experiments on the rate of forgetting Ebbinghaus, by experimenting with a large number of subjects, found out that the greatest amount of forgetting takes place just after the process of learning is completed. The initial fall of memory is greater than any which comes later. The conclusions of Ebbinghaus have been verified by later workers such as Boreas (1930).

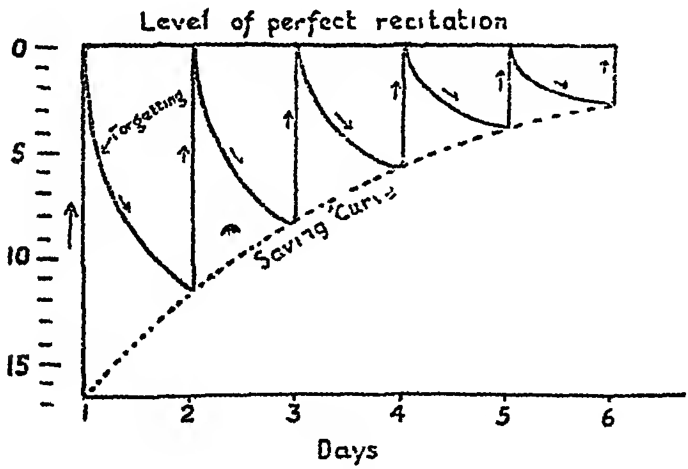


The accompanying graphs indicate that while the curve of memory obtained by Boreas shows much slower forgetting than that of Ebbinghaus, both curves have the same general course.

One-half of the material is forgotten in the first half-hour, two-thirds in eight hours to one day, three-fourths in about six days, and four-fifths in a month. Since the fall is most rapid in the earliest period after learning, it follows that the proper time for revising and recalling newly-learnt material is soon after it has been learnt, and not after a long break It has been suggested that if one hour is given to the first learning, then another half-hour should be given to recalling and revising.

This bring us to the problem of the distribution of learning periods—a problem commonly known as

massed versus spaced learning Ebbinghaus performed a memory experiment upon his own self He learnt and relearnt on successive days non-sense syllables, always to the point of one perfect recitation. He found that the necessary number of readings decreased from day to day *i.e*, the lesson was progressively better retained The results are illustrated graphically below:—



It thus appears that the first day's perfect recitation does not really mean as sound a learning as recitations of subsequent days. Therefore the material which one wishes to retain for long periods must not only be learnt to perfection once, but should be relearnt subsequently and the distribution of learning periods must be so arranged that the requisite re-learnings are provided at appropriate intervals On the basis of much experimental data, Jost enunciated the following two laws of Retention.—

I. If two associations are now of equal strength but of different ages, the older one will lose strength more slowly with the further passage of time.

II. If two association are of equal strength and different ages, further study has greater value for the older one.

A more direct comparison of the utility of the massed versus spaced learning is usually carried out in the following manner:—

Four groups of subjects of equal ability are taken. Group I does the learning for ten minutes twice every day for six days. Group II does twenty minutes at one time everyday for six days. Group III does forty minutes everyday, on three days; and Group IV does two hours all in one day. Thus two hours are taken by each group but its distribution is different. As a result of such experiments it has been found that the shorter and the more widely distributed the learning periods, the better is the result. However the learning periods must not be made so small as to become insignificant.

The reasons in favour of distributed learning are quite clear. In distributed learning, (1) the fatigue is less, (2) the perseveration process is repeated several times, and (3) the association links which are established become stronger because of endopsychic organization which is characteristic of reminiscence. In connection with the strengthening of associations Drever holds that "Not only does age make an association stronger, but it makes its retention better".[1]

[1] COLLINS AND DREVER: *op cit*, page 230.

Ordinarily there is a rapid fall of memory after the learning and then a slower one as more and more time is allowed to elapse. As time passes more and more is forgotten, although there is some percentage which is remembered even after years, the curve of obliviscence never reaching the zero level. Now, while the general results point in the direction of a regular fall of memory, it has been found in some experiments that there is not a constant slow fall after the initial fall, but a rise in the curve of obliviscence. Ross quotes one set of results in which "while after six hours 47% was retained, after one or two days the amounts were respectively 68% and 61%".[1] Such a condition is also to be found in the interesting investigation of Dr. Ballard, who found that the children of a certain school showed a higher record of reproduction of a poem learnt after a lapse of two days than just a little after learning. Ballard's researches in other cases also point in the same direction.

Why is this so? In memory, as we have said, an organization of the mental structures takes place after the impressions have been received. As time passes there is no doubt that some material is forgotten, but as a certain amount of endo-psychic organization of the mental structures is taking place a tendency to retain more is sometimes shown. According to Ballard, while, "obliviscence is a gradual process of deterioration in the capacity to revive past experiences, so is

[1] Ross. *Groundwork of Educational Psychology*, page 191.

reminiscence a gradual process of improvement in that capacity".[1]

Forgetfulness on the face of it appears to be a great drawback to the mental progress of men. The rate of forgetting is again alarming, and much of the learning apparently seems to go to waste But while the experiences are not reproducible at the individual's desire, they do leave their impressions which in a cumulative way (may be through the unconscious) influence his behaviour. Forgetfulness is as essential to the organism as remembering in his own interest. Life is full of pleasant as well as painful experiences and it is good that the latter be forgotten rather than remembered constantly.

Recognition and Recall.—In every act of memory certain aspects can be distinguished. Some psychologists have distinguished three aspects,—(1) impression, (2) the retention of impression, and (3) the recall or reproduction of the experience when desired According to others, only the two latter are the aspects of a complete memory process. Impression does not refer to the memory process strictly speaking Retention of some mental dispositions is essential to the organism, because the future conduct must be influenced by the past Retention must be assumed. The after effects of all experience must be permanent. But retention does not necessarily ensure reproduction We so often fail to remember or reproduce One of the reasons which experiments on forgetting tell us is

[1] *British Journal of Psychology*, Monograph Supplement No. 2, Vol I.

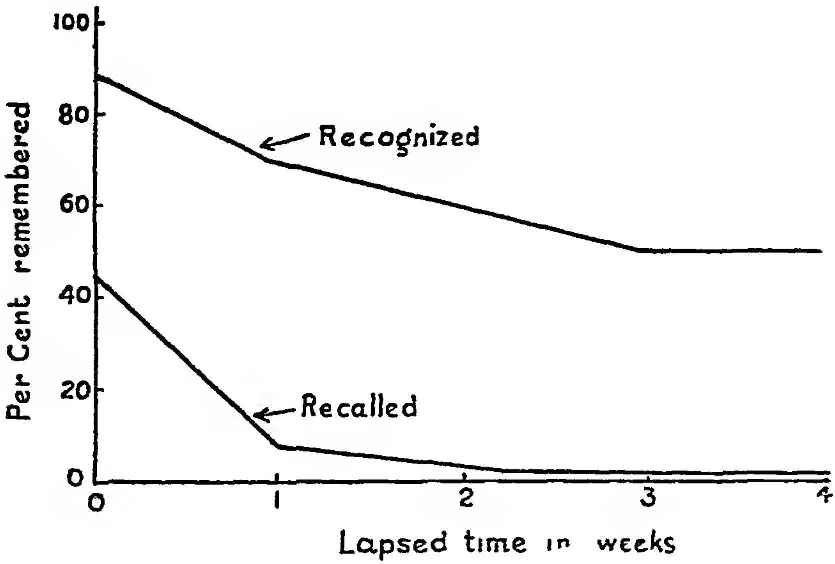
the 'lack of time,' but the more importat reason is the 'lack of interest'. A good memory necessitates a well-organized mental structure, and such an organization is not possible without interest

In connection with reproduction it is necessary to distinguish between recognition and recall Recognition and recall are both memory processes, and ordinarily the distinction between the two lies in the degree of acquaintance which is needed by the subject in the two cases A simple experiment in connection with this may be performed A set of twenty nonsense syllables may be taken Ten may be separated out from these, and read out to the subject three or four tmes. After a lapse of some time the subject may be asked to write down as many as he remembers. These ten syllables may then be mixed up with the remaining ten at random, and the whole lot read out to the subject. This time the subject may be asked to recognize those which he may have heard before, and write them down A comparison of the records in the two cases, one of recalling and the other of recognizing, will show vast differences

The accompanying graph with data from Bertt and Dobell[1] illustrates the difference between recognition and recall Valentine quotes results from two of his experiments, one with a class of 64 boys and another with a class of 75 In the former case, one scored more in recall than in recognition, five scored

[1] Bertt and Dobell *Journal of Applied Psychology*, 1925

the same in both, and fifty-four scored more in recognition than in recall. In the latter, none scored more



in recall, only eight scored same in both, and sixty-seven scored more in recognition

An important difference between the two processes is, that in recognition the subject is aided by a sense-perception of the familiar experience, while in the case of recall he is not. We forget the name of a certain book, and are unable to recollect it, but if the names of a number of books are read out to us, and the name of the particular book happens to be there, then aided by the perception there is a "feeling or sensation of familiarity," and recognition is made possible. It must, however, be granted that although recognition appears to derive aid from the perception of the moment, it is a "rudimentary act

of judgment"; in other words, a conceptual process In order to emphasize this point, McDougall distinguishes between 'implicit' and 'explicit' recognition The implicit is primitive as characterizes the mental activity of lower animals. A dog's recognition of his master or the boy who pelts at him is implicit. Explicit recognition represents a higher stage of mental evolution, as characterizes the mental activity of the highest animal—man In our recognition acts we know, we judge, and we compare according to circumstances.

Memory for Meaningful Material.—It was pointed out by us that in memory experiments, the material generally employed is non-sense material, either syllables or digits. Professor Bartlett[1] of Cambridge has raised objections to the use of non-sense material for deriving inferences about memory for meaningful material Interesting and useful experiments have been done in this connection. For instance, in the memory for stories, it has been pointed out that every story has a certain form which is represented by its plot and atmosphere Thus, a story such as "The House that Jack Built" has a certain definite form This is grasped hand retained even when the details have been lost to memory. Bartlett has pointed out that memory for meaningful material implies a memory for a certain form or "schema" of the material as a whole In attempting to reproduce a story from memory, one really *reconstructs* the story, preserving the form as one has grasped it and such details as one has re-

[1] BARTLETT Remembering, 1932

tained but inevitably drawing upon one's general stock of ideas for rounding out a consistent story.

Memory for the substance of a prose-passage has also been investigated. The passage is divided into a number of fairly equal units of "meanings" or ideas As an example, the following passage of 100 words has been divided into ideas or "units of meanings". A score for the memory of the passage may now be obtained by counting the correctly reproduced items after a lapse of time:—

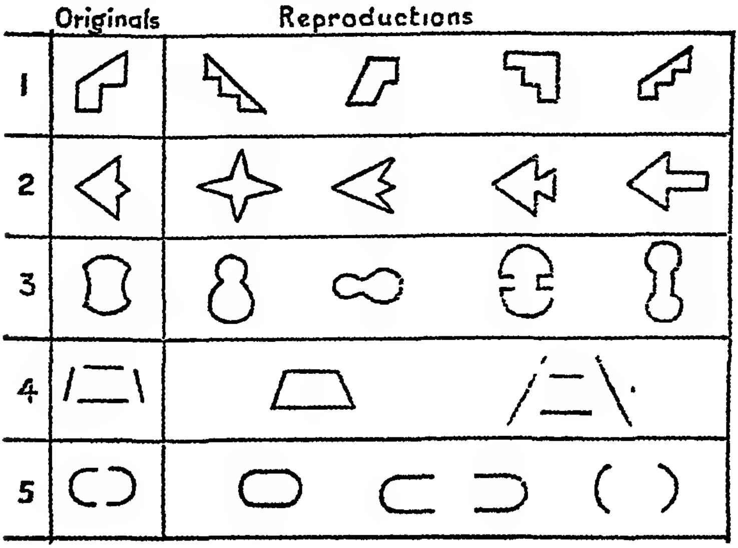
"A bear|climbing over the fence|into a yard|where bees were kept|began at once|to smash the hives,|and to rob them|of their honey.|But the bees,|to avenge the injury|attacked him|in a whole swarm together;| and, though they were too weak|to pierce his rugged hide,|yet, with their little stings|they so tormented|his eyes|and nose,|that, unable to endure|the smarting pain,|he tore the skin|off his ears|with his own claws,| and received ample punishment|for the injury|he did the bees|in breaking|their woven cells."

Memory for visual forms.—Reproduction of visual forms has been experimented upon in recent years. Gibson[1] exposed before his subjects five original drawings for a brief interval of time, and obtained their reproductions later from memory.

It is found that the general shape of the drawing is more apt to be reproduced than the details. A drawing seen to resemble any familiar object is modified in the process of recall into a "better" representation of the

[1] GIBSON *Journal of Experimental Psychology,* 1929

object. Details which originally made little impression on the subject drop out, leaving the figure more compact



and simple. Gestalt psychologists find in this another evidence of their Law of Pregnanz or "Goodness" in the cognitive acts of the mind.

CONDITIONS DETERMINING MEMORY

I *Perseveration*—This is the phenomenon in virtue of which the organism has a tendency to repeat within itself the experiences it has externally received This may occur in the case of purely mental as well as muscular experiences. As examples of the perseveration of a purely mental type, we all have the experience of a new tune "ringing in", or a newly acquired idea "coming up" again and again in our minds Examples

of the perseveration of a muscular variety may be foun in the movements of the hand in writing, knitting, et When the hand becomes accustomed to a certain typ of movement, it has a tendency to persist in the sam kind of movement, with the consequence that if there i an attempt to change over to a different kind of move ment, there is appreciable difficulty in doing so.

Perseveration plays an important part in memory particularly, immediate memory. There is a rapi falling off of perseveration in the period just followin that in which the learning takes place. Hence ther is a lot of forgetting in the period immediately followin learning. In permanent memory the value of perse veration is not great. It is the laws of association an habit that are more important. The stronger the bond formed the greater is the chance of the material remain ing in the mind All the forms of association distin guished before, should be made use of whereve applicable.

It has been found that the amount of perseveratio differs from individual to individual Each individua seems to possess a definite perseveration score for him self and this has been found to correlate highly wit the character qualities of the individual also. In fac the perseveration Test is one of the few satisfactor objective tests of character available at present[1].

The phenomenon of perseveration may be studied i the laboratory and the perseveration score of an indi vidual calculated in the following manner:—

[1] R B. CATTELL· *A Guide to Mental Testing* (1936), Chapter VI.

The subject is asked to write a letter such as S continuously for one minute; then, immediately following (without a break) to write a reversed letter Ƨ continuously for the second minute; and, finally to write immediately after (without a break) a combination of the two letters SƧ continuously for the third and fourth minutes

A variation of this may be to ask the subject to write continuously in the first minute numbers, 1 2 3 4 5 6 7 1 2 3. .... .(the numbers repeating themselves after 7), in the second minute letters A B C D E F G A B C......(the letters repeating themselves after G), and in the third and fourth minutes combinations 1A 2B 3C 4D 5E 6F 7G 1A 2B 3C... ...(the combination repeating themselves after 7G)

The perseveration score of an individual is obtained by subtracting the total of his work in the first and second minutes from that in the third and fourth minutes and dividing this amount by 2 On the basis of the perseveration score it is possible to distinguish three types of perseverators, the low, the medium and the high, each of which, it has been found, possesses certain well-defined character qualities.

In these experiments on perseveration what is really measured is the amount of interference appearing in the second half of the task due to the perseveration of the characteristics acquired during the first half of the task.

Retroactive Inhibition—In connection with the formation of permanent associations, the phenomenon

of retroactive inhibition plays an important part. If an association bond between A and B is formed and just following upon that a bond between C and D is formed, then the formation of the latter tends to inhibit the former. Every association in order to get fixed should be given time to set. If a suitable interval of time is not allowed and some new association formed interference is bound to set in. The latter retroactively inhibits the former. The inhibition operates more strongly if the bonds happen to be of an allied nature. It has been found that if we learn a certain material, say, sets of digits, on one day and then continue learning similar (not identical) sets of digits on subsequent days the retention of sets of digits becomes progressively difficult.

The phenomenon points to conclusions important for the teacher. (1) An attempt to deposit one idea after another in quick successions in the child's mind should be avoided, and (2) In drawing up the class time table, subjects of a similar nature should not follow one another closely.

Improvement of Memory—Can memory be improved by practice? Experiments have been performed to throw light on this question, but no definite conclusions either as regards the extent of improvement or as regards the nature of that improvement have been arrived at. The old psychologists believing in faculties and in their sharpening held that improvement in the faculty of memory was possible Since our fundamental conception of a memory process is different, we need not stop to consider the faculty theory. McDougall points out

that in considering the question of memory improvement the various factors of a memory process must be taken note of, *viz*, "(1) the power of committing to memory; (2) the retaining of the traces which facilitate reproduction, (3) the capacity for reproducing by the aid of these traces"[1] What McDougall is inclined to hold is that any improvement that is noticed is chiefly so far as it concerns the first factor, and to a certain extent so far as the third is concerned. As regards improvement in the second, *i e*, retention, he is highly doubtful

James, in arguing the question of memory improvement states. "No amount of culture would seem capable of modifying a man's general retentiveness This is a physiological quality, given once for all . and which he can never hope to change It differs no doubt in disease and health , it is better in fresh and vigorous hours than when we are fagged and ill"[2] In making this assertion, particularly in the latter part, James seems to refer to the power of reproduction which diminishes during physical weakness As regards retentiveness, most of the modern psychologists, including the psycho-analysts like Freud, and philosophers like Bergson, hold that all our experiences leave traces in the mind which necessarily modify the mental structure And so fas as the capacity of the mind in this direction is concerned, each individual has his own which nothing can improve McDougall and Miss Smith claim to have investigated the question

[1] McDougall *An Outline of Psychology*, page 296
[2] James *Principles of Psychology*, Vol II, page 664

of retentiveness through certain experiments They noticed sufficient improvement in some of their subjects to lead them to the conclusion that improvement in retention is possible by practice. The factors, however, are too complex to make us regard any such judgment as final.

Another phase of memory improvement, quite important from the pedagogical point of view, has also been investigated. Assuming improvement of memory to take place in some directions by practice, can there be a transfer of this improvement? In the old system of pedagogics there was the belief that memorization of grammar, and classics, etc., improved an individual's memory in general. Such a view was held because of memory being assumed to be a faculty, and also because undue importance was given to what we have called habit-memory.

Experiments of the following type have been performed to determine the possibilities of transfer. A class of say thirty boys may be taken and divided into three groups of ten each, assuring that each group is balanced so far as its capability of memorizing is concerned. By giving the whole class various types of memory tasks a classification may be made, and the parcelling into groups done. Now, Group I may be given poetry to learn by heart half an hour per day for fifteen days or a month. Group II may be given vocabularies of a foreign language for half an hour per day for the same period. Group III need not be given any particular memory work to do. It serves as a control group. The whole class may continue to

do the ordinary work, and carry on whatever memory work has to be done in the ordinary course of work. After this varying type of practice in memory work, all the groups may be given nonsense syllables, vocabularies, poems, and other material to memorize, and the performance of the various groups may be compared.

Valentine states some results of one of his investigations in this direction. One group which memorized poetry, when tested for the same type of wrok showed 15% improvement, while the control group showed none It may be argued that in both cases poetical ideas had to be dealt with, and this commonness was responsible for the progress But improvement has been noticed in case of dissimilar activity as well. The group which had practised with vocabularies showed an improvement of 20% when tested with nonsense syllables, while the control group showed practically no improvement. One of the arguments advanced is, that the improvement is due to the subject using refined and practised methods of memorizing, for instance, the use of rhythm made in one case is utilized in another.

Transfer of Training.—Memory experiments have thrown considerable light on the general problem of transfer of training. The old view was that memory, judgment, observation, reasoning, etc., were all general faculties which operated indiscriminately in all kinds of material. Consequently practice of the power in any type of situation sharpened the tool, and made it useful elsewhere Schools of pedagogy assumed that

certain subjects like classics, grammar, mathematics were the most effective instruments for the training of the mind. Now, while recent experiments in transfer of training indicate improvement in certain directions, (in some investigations improvement is noticed, in others not) the interpretation of this improvement is on an entirely different basis.

According to Thorndike. "A change in one function alters any other only in so far as the two functions have as factors identical elements. The change in the second function is in amount that due to the change in the elements common to it and the first The change is simply the necessary result upon the second function of the alteration of those of its factors which were elements of the first function, and so were altered by its training."[1] In order to consider over the type of identical elements, the process of memorizing could be taken as an illustration. When the subject practises memorization with one type of material he really practises a certain "method of attack", and becomes deft in that. It may, for example, be the use of rhythm. Having used this in one case, he subsequently uses it, and thereby shows improvement in further memorization. What appears to be a transfer of power is really the unconscious application of a device learnt. The transference may be even of a negative nature. A wrong device practised, *e.g.*, the habit of forming useless association, may interfere with further memorization instead of improving it. "What is carried over is

[1] THORNDIKE *Educational Psychology*

not an improved faculty of memory, but new devices, ideas, attitudes, emotions—in a word, a new technique, which may be good or bad in whole or in parts "[1]

Besides the transfer of devices and methods there is also a certain amount of 'transfer of facts or information' In the study of any subject certain facts are acquired, and these 'float freely in the mind, ready for use in any situation' Some words recently learnt are generally used by boys in their composition exercises or conversation, sometimes unconsciously, and so often deliberately A transfer of 'general attitudes and ideals' must as well be accepted, "Tendencies to maintain calm or to become nervous, to work rapidly or slowly, to be interested or bored, to be self-conscious or absorbed in the task—these, acquired in one situation, may be revived in others by means of common elements "[2]

Methods of Memorizing—With the help of experiments it has been found out as to what is the best method of memorizing a poem The ordinary belief is, that if the poem to be learnt by heart is parcelled out into a number of parts and one part is committed to memory at a time, the whole poem would be easily learnt But such a method has not been found superior to the procedure of memorizing the whole poem without taking it into parts The 'entire method' has almost always yielded better results than the 'sectional' one, up to a limit of 240 lines or so It is, of course, necessary

[1] GATES *Psychology for Students of Education*, page 366
[2] GATES *Ibid*, page 369

that in comparing the values of the two methods, two poems of equal difficulty should be chosen. In fixing the length of the poem the age of the individuals who form the subjects of the experiment must also be taken into account. With children a good deal of discouragement sets in, if the poem happens to be very long. In such circumstances, the 'entire method' may or may not give good results. Some investigators have found the 'entire method' to be superior in all cases. With others about two-thirds have done better with 'entire method', and one-third better with the 'sectional method'.

One thing which is in great favour of the 'entire method' is, that permanent learning is better effected by it than by the 'part method'. Sometimes the 'part method' yields good results, but only so far as immediate memory is concerned. When the subjects are tested after a lapse of a week or two, then those who have learnt by the 'entire method' invariably do better than the others. When the 'entire method' is used, the general meaning of the whole poem is kept before the mind. In the other case, each portion is treated as a unit, and hence a number of links have to be joined. In the 'sectional method' there is a possibility of a number of useless and wrong associations being formed, such as between the end and beginning of each portion. Again, the subject needs a good deal of prompting when he begins to recite each one of the sections.

In adopting a suitable method for children in school, questions of their age, interest, and material to be learnt have to be taken into account. In the

'entire method', when the results are slow in appearing the child feels considerable discouragement, and then acts of volition are needed which mean a drain of mental energy. In case of the sectional method there is, after all, the satisfaction of having learnt a part There is consequently no loss of self-confidence on the part of the learner Generally when the poem is a short one, *i e*, only twenty lines or so are to be learnt, these questions do not arise, and the 'entire method' works satisfactorily. The material to be learnt must be examined It is just possible that it may not be all homogeneous, one part may be more difficult than another In that case it may be divided into two parts, and each learnt by the 'entire method' It is in view of this, that a 'mixed method' has been suggested In this the learner starts by the 'entire method' and finds out in what portions the difficulty of comprehension lies When the difficulty is met, he stops and conquers it by learning that portion Then he follows the 'entire method' again The difficult parts may be first learnt to such an extent that the whole poem tends to be homogeneous

Gopalaswami has suggested the 'progressive method'[1] In this the whole poem or passage is divided into a number of sections, say 1, 2, 3, etc First of all section one is learnt, then section two, and after that section one and two taken together are learnt again After this the third section is done, and then all the three are taken together In this way the whole lot is completely gone through In this procedure

[1] *British Journal of Psychology*, Vol XV, Part III

the 'entire method' goes on superseding the 'sectional' one, and no wrong or useless associations are allowed to last The difficulty of doing too much material at a time and the discouragement arising out of that are eliminated. But in this method, some parts get more repetitions than the others, and consequently would be learnt more than necessary at the cost of others. The disadvantage, however, is at a minimum when the material to be learnt is not too long, and when the sections are also as few as possible. The method may also require more time.

In connection with the 'entire method' some important conclusions have been drawn by Winch,[1] which have a direct bearing on pedagogy. He experimented to investigate the question,—'Should poems be learnt by school children as wholes, or in parts?' He found that except for those poems in which there is perfect unity of thought and homogeneity of material, the 'entire method' is not superior to the 'sectional' one for children upto twelve years of age. For boys and girls above that age the 'entire method' could be used more profitably The adolescent is capable of more sustained mental activity, and if need be to use volition more than the child,

Economical methods of memorizing are essential to a learner. For memorizing different types of material, and in different subjects, different devices have to be adopted Memorization in each case is a specific kind of reaction, and general methods do

[1] British *Journal of Psychology*, Vol XV Part I.

not help in every particular process. It is through well-designed experimental work alone that the specific device suited to the particular type of learning can be found out 'Recitation' is one of the aids to economical memorization, and hence in order to determine its value, Gates has conducted an investigation to find out the relationship between recitation and reading and memorization In his experiments the material used consisted of nonsense syllables as well as sensible material He took sixteen nonsense syllables for nonsense material, and five short biographical sketches amounting to about 170 words for sensible material.

Using this material two general methods of reacting were tried in the act of memorization In one case, the subject read the material and re-read it, and went on doing this without looking up from the paper on which that material was written In the other case, the subject early or late (at varying times), attempted recitation and began to recall without looking at the paper except now and then when prompting was needed This latter kind of reaction is just the one that is demanded of the subject when he has learnt the material Gates holds that, "exercising as soon as possible the reaction that will be eventually demanded results in more economical learning" than any other device adopted This is clearly borne out by the results obtained from an experiment The recitation method proves to be better than the reading and re-reading one Below is given Gates' table[1] of results which is quite significant

[1] GATES op cit, page 270

Recitation *vs.* Re-reading

Material studied—16 nonsense syllables, 5 biographies.

	Per cent remembered.		Per cent remembered.	
	Immediately	After 4 hours	Immediately	After 4 hours
All time devoted to reading	35	15	35	16
1/5 of the time devoted to recitation.	50	26	37	19
2/5 ...... do	54	28	41	25
3/5 ...... do	57	37	42	26
4/5 ...... do	74	48	42	26

It is clear that in every case recitation proves immensely helpful, and the more the time given to it the better are the results. The rise is much more gradual and steady in the case of sensible material than in the case of the nonsense one. The advantage gained through the recitation device is relatively greater in the case of permanent learning than for the immediate one.

The principle of trying the sort of reaction which is eventually demanded, is admirably applicable in the case of the memorization of vocabularies when

learning a new language. The test of having learnt a vocabulary is, that on seeing a word of the one language the equivalent of the other is easily recalled. Suppose English to Hindi, or *vice versa*, is to be learnt. Then a good method of learning would be to take small cards and write the English word only one side and its Hindi equivalent on the other, and not both side by side on the same side A number of cards of this type may be shuffled together, and as soon as some partial learning has been completed, an attempt at giving out the Hindi or the English word when its equivalent in the other language is shown, should be made. In general in any learning process the teacher will find it quite profitable to determine precisely which type of reaction would be needed for practical purposes after the learning is complete, and then use that as a device during the process of learning

References for further reading

1 WOODBURNE: *Human Nature and Education*, Chapter IX.

2 MYRES: *Text-Book of Experimental Psychology*, Vol. I, Chapters XII and XIII.

3 VALENTINE: *An Introduction to Experimental Psychology.*

4 BERGSON. *Matter and Memory.*

5 MCDOUGALL: *An Outline of Psychology*, Chapter X.

6 JAMES: *Principles of Psychology*, Chapter XVI.

7 DREVER: *An Introduction to the Psychology of Education*, Chapter III.

8 SPEARMAN: *The Abilities of Man*, Chapter XVI.

9 G. H. THOMSON. *Instinct, Intelligence and Character*, Chapter XIV.

10 BOLTON: *Everyday Psychology for Teachers*, Chapter XVIII.

11 GATES: *Psychology for Students of Education*, Chapters XII and XV.

12 R. B CATTELL: *A Guide to Mental Testing* (1936) Chapter III.

13 WOODWORTH: *Experimental Psychology* (1939) Chapters II, III and IV.

CHAPTER X

IMAGINATION

IMAGINATIVE activity is one of the most wonderful psychical processes which the human mind is capable of carrying on Imagination help us to get beyond the range of our limited perceptual experience It helps us to place ourselves in the position of others, to sympathize with the suffering, to appreciate the beautiful, and in general to respond to situations as would befit a rational being Imagination aids us in bringing ourselves into mental contact with people of far-off lands, and makes us believe that the whole world is akin. Imagination is largely responsible for the growth of theoretical as well as practical knowledge Man's mind, devoid of imagination, could hardly make any advance in arts or sciences,—and, it is this advance which not only makes the present better than the past, but also ensures a future more hopeful than the present It should be the aim of school work not only to develop imagination, but also to give it the right direction with all the means at its command We all know that the school curriculum offers various suitable instruments like history, literature, geography, and nature study through which the teacher may train the child's imagination

Various mental activities which we refer to as imaginaton are at different levels, and can be carried on by the mind at different stages of mental development; and the teacher as usual has to study the needs of the stage with which he is dealing, the instrument that he is employing, and the purpose he is trying to achieve. Before we discuss questions arising out of these, we shall proceed to consider the psychological nature of imagination.

Nature of Imagination

To start with, it shoud be clear that imagination is a mental process. We have called it an activity which the mind is capable of carrying on. At the time when the mind is representing something before itself the organism is active. Again, this mental process is a conscious mental process; the organism consciously produces or reproduces something before its mind.

In the process of imagining we make use of mental images. We do not have any sense-perception at the time of imagining. We have a pure and simple mental apprehension. This mental apprehension may be a result of some original sense-perception, but imagination in itself is a purely mental process. When McDougall defines imagination or imagining "as thinking of remote objects,"[1] he definitely emphasizes

[1] McDougall: *An Outline of Psychology*, page 284.

the absence of sense-perception at time. In sense-perception the consciousness is of the objects themselves, they being presented to the senses; in the case of the imagination there is again the consciousness of the objects, but not as being presented to the senses According to Drever also, in the conscious process of imagination "the mental content is an image or complex of imagery"[1] This view again emphasizes the mental apprehension of objects, but not as presented to the senses

In ordinary language some confusion prevails regarding the use of the terms 'image' and 'imagine'. Both the verbs 'to image' and 'to imagine' are loosely used to mean the same thing, but psychologically they convey something different We have said, that in the process of imagination the mental content consists of images or complex of imagery, but we have to clearly understand that imagining is not imaging Imaging we have the mental apprehension of some perceptual experience that we may have had In other words, we try to reproduce before our mind the representation of the original sense-experience In imagining, while we have mental apprehension of objects, we do not carry on a process of mere reproduction. Imagining is imaging and something more. Imagining signifies that something new is evolved Whether this 'new' is built out of the past experience, or is new in any other sense, we shall presently examine But one thing is clear, and it is, that in the process of imagination the mind

[1] DREVER *An Introduction to the Psychology of Education*, page 190.

weaves something which is new as a whole, compared with anything experienced in the past.

From what we have said, it is clear that we draw a distinction between mere reproduction and imagination. Both are mental processes, and in neither is the apprehension of objects made through sense-perception, but they are different in the sense that while the former represents a pure memory process the latter does not. In order to include both these processes, in which mental apprehension of objects takes place, Drever uses the wider expression, 'ideal representation' He distinguishes the two forms of ideal representation, (1) memory, and (2) imagination, which he designates respectively, as 'reproductive ideal representation', and 'constructive ideal representation.'

In imagination although the mental content consists of images or complex of imagery, the mental experience as a whole, is new. The elements of which the whole is made are brought from the past, but they are set together to build a new structure. Imagination in one sense is reproductive. No imaginative activity is possible unless and until there is a reinstatement of past experiences But in the memory-reinstatement the elements follow the same temporal, spatial, and other relationships as in the original experience. We draw the picture which we have seen. In imagination while the elements come from the past experiences their original relationship is not maintained. There is creation and construction in the sense of freedom of mental manipulation of the elements. "The castles that are built in the air are always built with bricks

obtained on the ground; nevertheless, they may not correspond to any castle hitherto erected"[1]

How do the elements come in? How, and why are they set together in the particular way?—are problems for the psychologists As we have said, there are different levels at which the weaving of old threads takes place The mind at one time is controlled by one consideration, at another by another. Sometimes it flies quite unchecked and uncontrolled as in day-dreaming and vagaries of imagination

Imagination has been interpreted, rather erroneously in this narrow sense, as representing this uncontrolled and unchecked mental webbing. Consequently it is regarded as something derogatory, something which represents mental weakness, the exuberance of which needs to be deprecated and repressed While we do hold that a flight from reality represents a pathological mental state, we do not regard the power of the mind to create these new wholes as a weakness which needs a cure. The problem of education is not the curbing of imagination, it is the proper training and directing of it.

According to McDougall, the wide mental process (ideal representation) in which there is some kind of reinstatement of experiences, is of three different forms at different levels "We may usefully distinguish three levels of imagination The lowest is what is commonly called reproductive or representative imagination The

[1] WOODBURN. *Human Nature and Education*, page 191.

second is constructive imagination. The third is creative imagination."[1]

The first is pure memory in which the mental content or the whole mental experience as we have it, is nothing but an image of the past, a true picture of the old experience represented. We may sit down and recall one of the past experiences, say a journey, and then all the incidents connected with it come before the mind in their original relationship. The second is what he calls 'pre-perception.' Pre-perception has a reference to the future In pre-perception we have before our mind some of the unexperienced images. So often we try out a certain action before our mind. A carpenter who has to make a small table has a pre-perception of images which have definite future reference. He first draws a picture before his mind's eye in which he places a plank on the legs in a particular way, in other words he plans the table. He may adopt some mechanical aids, *e.g*, drawing on paper. After the mental manipulation he proceeds with the actual task of construction. McDougall regards pre-perception as 'the primitive kind of imagining.' The third, which he calls 'creative imagination', is that in which there is 'the creative combination of the elements of previous presentation', as in planning a new story, or solving a problem. From this point of view, theoretical mental reasoning becomes a higher form of imagination.

[1] McDOUGALL: *op cit*, page 219.

While distinction of levels may be drawn for purposes of classification in our actual experience we find that the classes are not clearly marked. An analysis of any of our imaginative processes will make this clear Regarding the number of levels of ideal representation, we would prefer to accept the division into two only,—(1) the reproductive which is strictly a memory process, and (2) the creative which is really the process of imagination. What McDougall calls constructive could safely be included in the second type, there being a difference of degree only in the extent to which adjustment and readjustment of images takes place We shall not include the reproductive in the pure imaginative activity. McDougall himself emphasizes the fact that, "the primary function of imagination is to depict the future, to anticipate the course of events "[1] He thus clearly separates it from reproduction which has a reference to the past only

Classification of Imagination

Imaginative activity can be classified into different types according to the nature of the elements that enter into the activity, and the purpose with which the adjustment of the elements is made in order to produce the new whole. A classification on the basis of these considerations is important from the educational point of view. A knowledge of it helps the teacher in training and directing the imaginative activity of the child. It tells him as to what guiding purposes are

[1] McDougall *op cit*, page 293

to be placed before the child on the basis of which he should direct his mental activity.

When a teacher describes to his class the lives of people in far off lands the imagination of the children is stirred, and they picture before their mind the place and the life there, on the basis of the clues given by the teacher. This is one type of imaginative activity in which the function of the mind is 'receptive and imitative.'[1] The mind first receives and then constructs. It is different from that type of activity in which there is no preliminary reception. The mind in this case itself creates and constructs When a child is asked to write a composition or make a short story without any clues being offered to him, he creates the pictures as a result of some mental activity.

Imaginative activity besides being distinguished into the two types receptive or imitative and creative, can be classified further into several sub-types. Drever's classification seems most appropriate and we cannot do better than adopt it.

While distinguishing between the receptive and the creative, Drever takes the illustration of an author who writes a novel and the reader who reads it. Both the author and the reader carry on imaginative activity, but while the former creates the latter receives the clues, and then combining the elements in the same way as the author has done, gets the whole picture before his mind. Creative imagination is

[1] It is receptive and imitative looked at from the point of view of the child. As regards the imaginative activity of the teacher in describing, it is not the same.

again of two types, one may be called 'pragmatic'. and the other 'æsthetic'. The distinction is based on the nature of the freedom which is allowed to the mind in arranging and rearranging the elements to prepare a new picture "The constructive activity which projects and designs a great bridge or canal, which formulates a new mathematical principle or an epoch-making hypothesis, can obviously be distinguished from the constructive activity which produces a great poem, a novel, or work of art, and the distinction is one which cuts deep into our whole intellectual life."[1]

The distinction depends upon the check or control that is placed upon the mind during the time when it carries on the constructive activity. In pragmatic imagination the mind is controlled by the conditions of the real world. There are the laws of science, the laws of nature, and conditions arising out of the nature of objects, which the mind cannot ignore. In constructing the bridge or canal the mind has to subdue itself to the conditions of realism Iron girders of a certain size can support only a definite maximum weight; the pillars on which the bridge stands have necessarily to be of a certain material and so on. While the mind constructs, it constructs a bridge as pertains to the real world, and not one in which the pillars are made of cotton-wool as in a fairyland.

In æsthetic imagination the mind is 'essentially free'. The controls, if there be any ('congruity and

[1] DREVER: *op cit*, page 192.

consistency with certain conditions may be demanded'), are not as they arise from the conditions of the objects, but as they arise from the mind of the subject who creates and imagines. The control is subjective instead of being objective. And clearly, that control does not belong to the real world in which we live and act, but to a make-believe world which the person imagining creates for the time being.

Yet another distinguishing condition may be noticed. The activities in the real world yield pleasure to the doer mostly when they are achieved, *i.e.,* when they come to a successful termination. It is when the problem is solved the hypothesis enunciated, the bridge planned, that the pleasure comes. The activities in a make-believe world yield pleasure to the doer mostly during the course of the activity. To the dreamer the joy is in the course of dreaming rather than when the dream is complete. When we build castles in the air the pleasure is in the course of the day-dream, and not so much when the castle is complete and ready. The distinction is not rigid but comparative. In æsthetic imagination the greater pleasure is during the activity, while, in the case of the pragmatic when the result is achieved.

For purposes of further clarity and better understanding, both 'pragmatic' and 'æsthetic' have been sub-divided into other types. "Pragmatic imagination may be either theoretical or practical, according as its immediate aim is uunderstanding or action". The engineer who designs the bridge, and the scientific thinker who enunciates the hypothesis, both employ

pragmatic imagination But, while the engineer's aim is to actually have the bridge constructed, the theoretical scientist's is to understand and generalize certain noticed facts. For both of them the controls during imaginative activity are objective, but the ends with which they carry on the activity are different in nature

Pragmatic imagination of the practical type is what we constantly need in our material life in preparing schemes of work and action, and in making all sorts of organizations needed for the success of our business. Some would be inclined to relegate the theoretical pragmatic imaginative activity to a higher type of mind, and the practical pragmatic to a comparatively lower one The necessities of the situation demand a particular type of imaginative activity, and a classification of the minds on this basis alone would seem unfair

As regards the æsthetic imaginative activity, it may be 'artistic' or 'phantastic'. In both artistic and phantastic the mind is essentially free But while in the phantastic it passively rolls along, as in day-dreaming, in the artistic there is more of purposive direction, as in planning a drama, a novel, or a work of art The former is unproductive, the latter is fruitful and beneficial not only to the individual but to a society.

Imaginative activity is responsible for the formation of ideals. Idealism is not altogether under objective control It issues forth from a well-directed but essentially free mind. Idealism rises above the pure practical level, but while it does so true idealism never loses sight of it. Thus, "imaginative activity which

issues in the formation of ideals occupies a unique position, in that it shares in the characteristics, at different stages, of both æsthetic and pragmatic"[1]

The following table summarizes the classification:

IDEAL REPRESENTATION
- Reproduction or Memory
- Imagination
  - Receptive and Imitative
  - Creative
    - Pragmatic
      - Theoretical
      - Practical
    - Æsthetic
      - Artistic
      - Phantastic

IMAGINATION AND EDUCATION

Accepting the distinction between the various types of imaginative activity, the next problem that we have to consider is, as to which of these or all are such, whose development should be aimed at in education. The present age all over the world is tending to be scientific. The world is a world of men and things, of real objects as they are governed by the laws of nature and different sciences. There is a tendency in most countries towards complete industrialization. Whether we in India have turned towards that direction entirely is questionable, but we do aim at the present time at greater efficiency of material life than before, although

[1] DREVER. *op cit*, page 194.

we may not assign the highest value to that aspect of life. Under such circumstances there can be no two opinions as regards the necessity of developing the pragmatic type of imaginative activity.

To live successfully it is necessary for the individual to be able to extend his mental experience to limits beyond the sense-perception, so that life's practical problems may be correctly and efficiently solved. The enunciation of hypothesis is necessary for pushing a practical enquiry further, and the practical solution of details and experimenting necessary for generalization. Generalizations and theories are needed for short-circuiting our responses, and practical experimentation is necessary for arriving at generalizations. We need, therefore, to train the child's practical as well as theoretical pragmatic imagination The development of the practical is easier, and takes place at a comparatively lower level of mental development than the theoretical

Imaginative activity, of whatever type it be, demands a preparatory contact with, and a grasp of, the concrete We have said that in imaginative activity we have a mental content consisting of images or complex of imagery. The more accurate and definite the images the more efficient is the imagination, and the clearer is the mental experience during the activity It is therefore necessary that the child should be made to cultivate good imagery The function of the image is rather important, since it tends "to make past experience available for present use, and to some extent to define the future event beforehand".

We have distinguished the different types of images, and the nature of sense-perception necessary for obtaining each. The more concrete objects are purposefully examined, the greater will be the cultivation of imagery. One of the great aims of sense training through objects in Montessori schools, is to enrich the imagery of the child through contact with the concrete. When the child has passed the kindergarten stage, contact with the concrete may be comparatively diminished, but nevertheless its value as the special aid in educating the child's mind is retained throughout. In science, manual training, nature study, and drawing the child is made to deal with things and objects, and thus develop imagery.

Images may be 'concrete,' or they may be 'verbal' (symbolic). The difference between these two lies in the degree of abstraction of the image. In an image, whether concrete or abstract, there is the reinstatement of past experience. When this reinstatement is of a particular perceptual experience we have a concrete image. When we mentally apprehend our 'college building', we have the reinstatement of the college building exactly as we have seen it. Our mental picture exactly resembles the particular and actual college building. In this case our image is concrete. It is a faithful representation of the concrete experience. In another case our imagery may be symbolic. When we comprehend the word 'building' we mentally apprehend something whiich is not necessarily our particular college building, or for the matter of that, any

other. Our image has a general composite character. We cannot trace it to any particular perceptual experience, yet it owes its structure to the sum-total of our perceptual experiences of various buildings. According to many psychologists, it is these generic verbal images that constitute our thinking stuff Some psychologists, however, hold that imageless thinking is possible, but we shall not enter here into that great controversy of the experimental psychology of thought processes.

Children's images are concrete, and as a rule richer and much more varied than those of the adults "The child's imagery is mainly concrete and the adult's mainly verbal: only about two per cent of the imagery of the pupils of school age is verbal."[1] The influence of education, clearly, is to decrease concrete imagery and increase the verbal As a result of education the child's mind develops in such a way as to rise from the level of concrete thinking to the abstract one.

Abstraction is, and should be, the aim of mental development on the intellectual side. A mind that remains all its life at the concrete level is either deficient or ill-trained. Concrete imagery impedes abstract thinking, while verbal imagery aids mental short-circuiting, and makes it easy for the mind to unravel most complex situations. But while all that is so, it has to be clearly understood by the teacher that the process is not to be excessively hastened. The mistake made by bookish, unscientific, and theoretical methods of teaching is to expect a too

[1] RUSK: *Introduction to Experimental Education*, page 107.

early transference of the mind from the concrete to the abstract level. One of the principles of modern pedagogy is to check such a hastening, but at the same time to ensure a steady yet certain change from the concrete to the abstract level.

To return to the development of imagination. While all schools of thought are agreed to the necessity of training pragmatic imaginative activity, they are not unanimous as regards the æsthetic imagination. According to one school, the development of æsthetic imagination is an essential phase of the growth of a cultured mind capable of looking beyond a world of mere facts. It is not without it that any idealism is possible Without the exercise of æsthetic imagination the mind cannot fully express itself, nor can it evolve anything over and above what relates to a world of objects and facts just as they are. Those who are not in favour of the æsthetic imagination argue that the child's mind as it is, has an exuberance of imaginative activity, pertaining mostly to the make-believe world; and hence instead of letting it develop further it needs to be checked and controlled, lest the child develop into a phantastic and unpractical adult.

Some of the contention seems to arise out of a narrow interpretation of æsthetic imagination. Those who object to its development, mostly regard it as belonging to the phantastic sub-type. If it is wholly that, no scheme of education would aim at training it. But it is not that alone There is that type of æsthetic imagination which is essential, both for producing as

well as for understanding the great works of art, literature, drama, painting, sculpture, architecture, etc None need question the necessity of training that kind of imagination which helps the growth of art, and consequently of culture and civilization As scientific progress helps in the growth of civilization, the development of art is no less a contributive factor.

There is exuberance of imaginative activity in the child, and that of the non-pragmatic type. It may be taken as the drawback of the child-mind, but really speaking it is one of the great assets of the child, when we realize its importance in education Why has the child this excess of phantastic imagination? To start with, a child is much more cut off from the real world as compared to an adult who has to act in it constantly. The child is full of energy, and his energy naturally finds expression in the make-believe world This may be altogether phantastic, at any rate, it is not governed by the laws of realism.

Again, according to the age of the child, the tendency of play expresses itself whenever any opportunity is provided to it Play involves imagination The child imagines himself as a king or queen, as an individual reacting in a fairyland in situations different from those related to existing objects and persons While he plays he makes the make-believe world his real world He reacts in it as realistically as the adult does in his real world. He regards his reactions as of considerable importance They mean the same thing to him as the tasks of real life to an adult. A child playing a certain role, say of a king or a judge

or a commander, when disturbed and called by the mother for his meals, etc., gets annoyed, and may even remark angrily that he is much too busy disposing of an important business and would not come.

The child's mind is full of phantasy. But this phantasy cannot be regarded as pathological, in the same sense that an adult's is, as expressed in dreams, etc. His phantasy represents his child nature. Since the child is already full of phantasy, Montessori sees no reason why any active attempt should be made in education to develop this further in the child. Not only does she desire not to help its development, but she advocates the necessity of adopting all such means and methods as would control this excess of phantasy in the child. She is against children reading fairy tales, and myths, etc., for fear of the phantastic gripping of the child-mind further.

The exuberance of imaginative activity, if it is provided further nutrition by way of myths and fairy tales, has a chance of taking the child-mind further and further away from reality. The more frequently does the child indulge in this sort of reading the more credulous will he tend to become. Myths and fairy tales tend "to perpetuate that credulity." "Is this illusory imagination based upon credulity, a thing we ought 'to develop' in children? We certainly have no wish to see it persist; in fact when we are told that a child 'no longer believes in fairy tales', we rejoice. We say then: 'He is no longer a baby.'"[1] According to Montessori, real scientific study obviates this.

[1] *The Advanced Montessori Method*, page 257

If from the earliest period of his life, a child through various means and methods is brought into contact with the objects of the real world, then he will grow up to be a person who would not be a dreamer, but be successful in the practical tasks of life

Now, no system of education is against elementary scientific training, or for the matter of that, against any such methods as tend to bring the child in contact with real objects. Education does not aim at preparing men who would be mere dreamers. We would not advocate the development of the child's phantastic imagination on lines as would produce a pathological state of mind. But it seems difficult to agree with the bias which Montessori proposes to give to her scheme of education by cutting off the child altogether from tales, myths, stories, etc., wherein lie the seeds for the growth of the literary, the dramatic, and the artistic mind. As Drever very significantly remarks, "to repress the child in this respect is to cut him off from the language which Homer, Dante, and Shakespeare speak, and to shut him out from the world of ideals and truth and beauty".[1]

What holds true about the world of Dante and Shakespeare in the west, holds true also in India about the world of Tulsidas, and Kalidas, etc A Hindu child having been cut off from Ramayan or Mahabharat during the period of his great imaginative activity would, despite the best education, have a distorted culture A mind not susceptible to beauty or truth, one which

[1] Drever op cit, page 199

has not evolved any ideals, is insufficiently integrated. In every country or civilization the child must be introduced to the world of the indigenous stories, myths, and tales. But here again, a system of education that aims at developing and training the æsthetic imagination alone, by providing full scope to the child for his mental wanderings, is open to grave dangers. "Conformity to a world of solid and definite fact is at least as essential as the development of an ideal world."

We have therefore to advocate that while the child is not to be deprived of those means through which he develops æsthetic imagination, he is surely not to be sundered from all those educational processes which aim at giving him experiences with real objects and facts, and train his pragmatic imagination. Scientific training must be introduced as early as possible, but the child is to be trained to see beyond the world of facts, because "positive science knows only facts; ideals are wholly beyond its range, and beyond its comprehension."[1] There is no value in life without ideals as much as without facts and reality. In a world of facts alone, activity and progress are at a cessation, and ambition works on a very low level.

We distinguished between the phantasy of the child and that of the dreaming adult. In the case of the latter, according to psycho-analysts the phantasy expressed in dream represents a pathological state. A dream, whatever its nature be, must be regarded as a form of expression of the imaginative activity. We

[1] DREVER: *op cit*, page 199.

have dreams in the sleeping state as well as during the waking one, as when we have a day-dream In both these there is a succession of some kind of imagery not necessarily resembling the original experiences, but mostly the distorted form of the same Besides imagery ideas also form the mind content in dreams, and these ideas although derived from real ideas, are phantastic as they appear in a dream Dreams are not made of ethereal stuff, but of imagery and ideas derived from past experiences. During dream all our conscious processes are more or less at rest But it would be wrong to say that our whole mental life is at a standstill. If that were so there would be no dream

Various problems in connection with dreams have been studied First, as to the mind content As we have said, this consists of imagery which represents, both as regards the nature of the elements and their succession, some of the past experiences In some cases the events which have occurred may be exactly re-enacted In other cases, which are more frequent, there is distortion of images and derangement of their order in varying degrees.

Why does this distortion take place? One[1] of the explanations is, that during a dream there is the absence of the affective element of consciousness, and hence the mind becomes altogether insusceptible to shame or a feeling of absurdity According to Freud, this distortion is purposeful, the purpose being to evade the censor

[1] This is RIGNANO'S view, vide *A New Theory of Sleep and Dreams*

This evasion is possible when the major part of the conscious process is at rest, and the censor is not sufficiently watchful. The other question considered about the dream is as to what causes it. The psycho-analysts are positive about it, and trace its origin to the repression of wishes. The repressed wishes of the waking life find expression in dreams.

Another problem which has been of interest to psychologists is the relation of the dream to the general life Some hold the belief that dreams represent the past; others say they predict the future. There are many popular beliefs, but they have very little psychological basis. In India different meanings are attached to different types of dreams. Some are said to give notice of a happy happening, others are a warning of some unhappy occurrence. Yet others directly predict the future What is seen in the dream must come to be true after a certain amount of time:—

यह सपना मैं कहउँ पुकारी। होइदि सत्य गये दिन चारी॥

Whether such notions are based on any psychological foundations it is very difficult to say. There can be no difficulty in believing that a dream is related to the past as disclosed by psycho-analysis. Regarding its relationship to the future, it may be said that the purpose of the dream is to reveal the morbid state of the mind to the subject, so that should he wish

[1] *Ramayan* (*Sunderland*) 'I emphatically state that this dream will come true a few days hence'

to avoid further mental worry or disturbance, he may direct his mental activities differently.

The dream of the adult is a result of repressed wishes, and represents a mental disease. It may be aggravated by physical weakness, as in the case of illness, etc. When that does not exist, the frequent occurrence of a dream calls for serious attention. As regards the child, at times day-dreaming may be brought about by the repression of some of his wishes, and then it gradually results in the formation of complexes Such condition needs control. But in most cases, the child's dream is the result of innocent phantasy related definitely to the tendency of play which is finding expression at every step. Play necessitates a make-believe world, and the child's imagination flies wild all over it. While this flight of imaginaton needs to be directed, it should give no cause for alarm. Fairy tales may aggravate fancy, but so often they supply a path for passive self-expression

Some psychologists are inclined to think that day dreaming is not an activity of such a nature that it should be discouraged or altogether repressed in children The flight of imagination in a day-dream gives the child a sort of relaxation, and makes him escape the pressure of the real world without mental strain. "Day-dreaming is not in itself bad: on the contrary, it is, for most people, almost a condition of mental health; it becomes dangerous under certain circumstances, or when carried to excess"[1] There may be some

[1] Sturt and Oakden: *Modern Psychology and Education*, page 198

truth in such a statement, but one would regard it more wholesome for the growing child to romp and play about, to take part in games and sports, or read tales and stories of adventure, than sit lazily and build castles in the air. Some relief may be got by the expression of pent-up feelings through this channel. But the better system of training the child is to bring him up in such a way that there is little or no possibility of the repression of tendencies and feelings.

Experimental Psychology of Imagination

Imagination has not received the same attention of the experimental psychologists as 'attention' or 'memory,' still it is worthwhile noting some of the methods which have been devised to test the fertility of imagination and to study mental types as disclosed by the imaginative activity.

As regards testing the fertility of imagination a simple method has been devised. The 'ink blot' experiment as it is called, was designed by Binet and Henri, and later improved upon by Whipple. Twenty ink blots, one on each card, are presented to the subject. He looks at one at a time, and for a certain amount of time focuses his attention on it with a view to imagining what it seems to represent He may try the card in different positions, and then express what he imagines The total number of varied pictures presented, gives an index of the subject's fertility of imagination It is not uncommon to see that if we stand gazing at the horizon some morning or evening and

find some clouds there, our mind starts wandering and we see all sorts of phantastic pictures. We see now a mountain range, then an army of soldiers one behind another, then a map of a certain country or province, then the figure of a demon or a monster, and so on The more we can see the more fertile our imagination is regarded

Simple experiments may be carried out to distinguish mental types on the basis of imaginative activity. (1) Massilon's method.—The subject may be given a certain number of words say three or four (nouns, and verbs mostly) He may be allowed a fixed time, five minutes or so, and asked to construct as many sentences as he can using those words The number of sentences constructed gives a quantitative measure, but a qualitative estimate, which can be made by an examination of the sentences, is also necessary to reveal the mental type. (2) Sentence completion method adopted by Binet.—A certain number of partial sentences of the following type are given, and the subject is asked to complete them in any way he chooses, *e.g*, "(*a*) I am now .. (*b*) He saw clearly .... (*c*) In this town.. ."[1]

Binet tried this experiment on his two daughters who belonged to different mental types. One of the partial sentences given was, 'I am hastening..,' and the completed sentences given by the two girls Armande and Marguerite were respectively,—'I am hastening, to write to you, for I have scarcely any

[1] VALENTINE· *Introduction to Experimental Psychology*, page 30.

longer to live', and 'I am hastening to finish my tasks in order to have time to play afterwards.' The two statements are sufficiently expressive and need no comment. One is from a phantastic mind, the other surely from one who is under the perfect control of the factual world.

References for further reading

1 DREVER: *An Introduction to the Psychology of Education*, Chapter X.

2 McDOUGALL: *An Outline of Psychology*, Chapter X.

3 RUSK: *Introduction to Experimental Education*, Chapter VIII.

4 MONTESSORI: *The Advanced Montessori Method.*

5 DRUMMOND: *Some Contributions to Child Psychology*. Chapters VI & VII.

CHAPTER XI

THINKING AND REASONING

THE process of thinking is regarded as the special gift of nature to man. It is supposed to be a matter of vital difference between man and the other animals This is not the place to enter into a discussion as to whether animals, particularly the higher ones, are capable of doing any thinking or not It is argued that in their responses they reveal insight, they can do rudimentary thinking, and can short-circuit their responses to a certain degree They have, however, very limited means for this short-circuiting process They do not possess the instrument called language. Their perceptual experience again is very meagre. Whether we admit it as a difference of degree or of kind, thinking, interpreted in the narrow sense of a conceptual process, must be regarded as man's special possession

It is because man can carry on this process of thinking that he rises above the level of purely impulsive or routine action While he is moved by innate tendencies and appetities, and responds on their basis like the other animals, he is capable of seeing beyond the end present 'here and now,' and adjust his responses accordingly He can "act on the basis of the absent and the future" To a thinking being, things

which he perceives signify quite a lot which is not being perceived at the moment.

Thinking is a means which helps in mental adjustment. To be able to adjust one's response without the necessity of perceiving every possible item in a certain situation, is what can be done with the aid of thinking. Human life is far more complex compared with the lives of the lower animals, and, but for thinking, man could not adjust himself to his environment and fulfil the aims of his life. The more efficient thinking an individual can do, the more appropriate will his behaviour be, and the more successful will he be in the tasks of life. It is essential that a child should be trained to think, so that he may utilize this ability to his best in reacting towards his environment. Instruction in, and intellectual training through, certain subjects of the school curriculum can train the thinking powers of the child.

Psychological Nature of Thinking

Drever defines thinking as the "activity of the 'growing point' of the individual mind".[1] Thinking, whatever its nature may be, is to be understood definitely as a mental process. 'Thinking' refers to the process, and 'thought' refers the mind content during the continuity of that process. Ordinarily, thought may be identified with the stream of consciousness, and hence thinking may be regarded as the mere passage of ideas before the mind,—the mind

[1] Drever: *An Introduction to the Psychology of Education*, page 207.

remaining passive. There is a difference between reverie, *i.e.*, allowing fleeting ideas to pass before the mind, and real thinking. The latter is an active process, in which the mind controls and regulates the movement of ideas in a purposive way. Here again, we differentiate various levels at which this active process is carried on. When the movement of ideas is regulated in a definite way to meet certain specific ends, we should say that thinking and reasoning become one.

Perception, thinking, and reasoning could be regarded as similar processes in a wide sense, differing from one another more in degree than in kind. A pencil lying before us on the table is first perceived We just apprehend it mentally as the object pencil, and thus far it is perception. Suppose we then let various ideas concerning the pencil revolve in our mind We may differentiate various qualities (roundness, colour, size, etc.,) belonging to the pencil, or do something like that; we are then said to think about the pencil. If instead of letting all these ideas about the pencil pass before the mind, we direct our attention to the solution of some specific problem about the pencil,—*e.g.*, why is the pencil made in a particular way?—then, we may be said to be carrying on a process of reasoning. Some psychologists have used the expression 'perceptual thinking' to retain the continuity of mental processes between animals and man, always emphasizing the fact that there are different levels of thinking. Whether perception should be regarded as thinking or not, we shall presently discuss.

According to Dewey, there are four senses, from the wider to the limited, in which the word 'thought' can be used. In its widest usage it includes, in general, everything that "comes to mind, and goes through the head". Anything of which we have a mental apprehension is included in our thought. Reverie is included in this broad sense of thinking, as is also perceptual experience. Next, we may make the meaning slightly narrower, and exclude perceptual experience from thinking. In this sense, when we have the mental apprehension of objects which are presented to the senses, we are not supposed to do thinking. We think of an object when it is mentally apprehended without being presented to the senses. But the passing of fleeting images is included in this kind of thinking. Thirdly, the meaning is restricted "to beliefs that rest upon some kind of evidence or testimony."[1] In this case, what passes through the head is certainly beyond what is presented to the senses as in the second sense, but it does not pass before the mind in a disjointed or illogical way. Everything that forms the mind content in this sort of thinking rests upon real or supposed knowledge. It is marked by "acceptance or rejection of something as reasonably probable or improbable." This acceptance or belief may rest upon faith or inquiry, and hence a fourth distinction may be drawn. When the mind accepts the belief without any question, we do thinking of the lower order. In another

[1] Dewey: *How We Think*, page 1.

case, when we try to search for the grounds of acceptance we do thinking of the higher order The latter type of thinking Dewey calls 'reflective thinking' As we shall see, 'reflective thinking' is 'reasoning' when there is a well-defined problem before the mind Dewey's reflective thinking is, "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends"[1] It is in the training of reflective thinking the education has to interest itself.

Perception and Conception

Perception is the mental apprehension of an object as grasped through the senses. When we perceive a particular pen that is lying before us on the table, we mentally apprehend a complex of qualities—size, length, thickness, shape, colour, etc. All these qualities are included in our recognition of the object The mental apprehension is implicit, and if desired, we can make it explicit to varying degrees by describing these qualities Our percept represents the particular Our perception of the pen means the apprehension of the particular pen on our table As we perceive one object after another of a certain class, we gradually begin to grasp a generalization We have the perceptions of several of our pens, also of the pens belonging to our friends and others. And, our mind begins to apprehend not merely a particular pen

[1] DEWEY · *op cit*, page 6

but the object 'pen' in general This process of generalization is greatly helped by certain symbols which we can mentally manipulate. These symbols are generally the words of the language we use as our medium of thinking and expression. This process of generalization by which the mind apprehends the general as differentiated from the particular is called conception.

The formation of concepts or the gradual process of generalization was first discussed by Plato. His 'theory of ideas' was developed on the basis of metaphysical considerations. When we make use of a common noun such as 'pen,' what is it that our mind apprehends? Does it apprehend the particular fountain pen we use in writing, or does it apprehend the small black pen which is in our inkstand? Analysis shows that what the mind apprehends is neither of these exactly. Yet the mind understands what the class of objects called 'pens' means. And it can manipulate this general idea in relationship to other ideas, general or particular. When we make a statement such as, 'pens are used to write with', or 'pens are sold at the stationers's,' we manipulate the idea of 'pens' in relationship with the ideas of 'writing,' 'selling,' 'stationer,' etc If we could not, we could neither make any of these statements, nor comprehend them.

According to Plato's theory of ideas there was some entity which corresponded to the common noun, and this was apprehended by the mind. To apply his theory in the case of the common noun 'pen,' we might

say that the common noun 'pen' stood for a certain ideal pen which included within itself all the qualities of all the possible pens. This entity did not merely include the qualities of only a few of the pens seen by any individual, but it represented an ideal not existing in the material world, which included within its pale all the possible qualities of all the possible pens Now according to Plato, this 'general or ideal pen,' the imaginary entity, could not be grasped by the senses but by the intellect only, in other words it was the function of the soul. The body could sense, the soul alone could carry on ideation A partial reflection, however of the ideal was to be seen in the various concrete objects as they existed in the material world, and were apprehended by the senses

Psychologically, the formation of concept is only a continuation of the process of perception. For psychology it is not important as to what is the nature of the generalization, but how it is formed Whether the 'general' when formed, represents the 'ideal' or not, is not a matter of its concern. How is a psychological concept (as differentiated from the metaphysical) formed? The process is a slow one, though plain enough. Arising from simple perception, it is through a process of abstraction that a concept is formed.

According to Ward, "the growing mind passes beyond mere perception when some striking peculiarity in what is at the moment noticed is a bar to its definite recognition."[1] A child sees his mother and

[1] WARDS *Psychology Principles*, page 305

perceives her. By repeated perceptions he may differentiate certain parts, qualities, etc., which make him recognize an object similar to his mother. There is constant association of the name 'mama' with the object 'mother' which he sees every time. Now, when the child comes across another lady his recognition is obstructed, and noticing the likeness in some crude way he may label the new object (the lady) as 'mama.' The process of naming is so often easy, but sometimes it becomes very difficult when the elements of similarity are very few and require careful analysis. When the similarity is very close, a 'wolf' is called a 'dog', and so also a 'jackal'. Abstruction does not involve merely the noticing of similarities but the distinguishing of differences as well. Whenever the child is confronted with a new object he analyses the perceptions and images that he possesses, and then he puts them together or synthesizes them in order to interpret the object. The interpretation in the early stages is inadequate. As the perception becomes richer the interpretation becomes more adequate.

The observation of objects, and their comparison lead to the formation of general ideas or concepts. The child notices objects of food first and so it forms some concepts of the 'eatables' Then he forms concepts of common objects like toys, books, pens, chairs, etc. From the more common objects he passes on to other objects less common, *e g* , king, queen, garden, etc. Along with these arise crude concepts of abstract things and qualities like studies, examination, justice, truth, honesty, etc. Some thinkers restrict the use of

the word concept to those only which refer to abstract ideas and not to concrete objects

From what we have said about the formation of concepts it is clear that some sort of judgment becomes necessary for the process of abstraction We observe, compare, discriminate, in other words we judge before forming any concepts But it may be argued that judgment does not precede concept-formation It is the concepts that aid thinking and reasoning, and help us in forming judgments Now, while a concept is a result of judging, concepts are themselves necessary for the process of judgment to be carried on We have to have the concepts of 'blind' and 'man' before pronouncing the judgment about a certain person that he is 'a blind man' Truly speaking, both the processes go on side by side to bring about intellectual development It is not that concept-formation ends at a certain point and then judgment starts

The earlier concepts are crude and inadequate As more and more judgment takes place they are refined and rendered more exact Through a process of education every individual goes on improving his concepts Concepts of different people about the same object or idea may be different The teacher of biology has a cencept of 'animal' which is much more complete and exact compared to that of a school boy's, because of his more thorough observation, discrimination, reasoning, and fuller knowledge The concept of 'justice' for a philosopher like Plato is different from that of a student of logic or politics. While concepts become thorough with increasing observation and reasoning,

richer concepts render judgment and reasoning more exact and complete

To return to our old point, while conception is a result of the process of abstraction, it takes its rise out of perception. Observation, comparison, and contrast of concrete objects lead to concept-formation. A child's perceptual experience must be enriched as much as possible so that adequate and accurate concepts may be formed. Observational work with concrete objects and things must, therefore, occupy an important place in the early stages of education. It is the accuracy and sufficiency of this work that will later ensure exactness in the thinking process.

Conception Thinking

Thinking in the widest sense means anything coming to the mind. But we shall not include such mental apprehension as takes place in perception in the specific process of thinking. Thinking must be regarded as a conceptual process. While we differentiate between the perceptual process and conceptual thinking we regard as continuous all processes from perception to conception. Psychologically, there is a difference in the level of the intellectual activity as we pass from concrete to abstract thinking.

In thinking the mind deals with concepts, but not all moments when concepts are before the mind are thinking moments. Concepts may be passing through the mind in a random way, but this will not constitute thinking, although psychologically it may be so called. For true thinking there must be a logical

nnection between the concepts When the mind
rries on an active process attempting to manipulate
e concepts and connect them in a purposive way, then
is said to carry on logical thinking. For intellectual
velopment it is logical thinking that is really more
portant Logical thinking is purposive, and is of
eat value to the person thinking. It is the business
education to encourage logical thinking.

When Dewey uses the expression 'reflective think-
g' he means to emphasize the logical aspect of the
ocess Concepts are needed for thinking, and think-
g improves and develops the concepts As we have
en, the child forms some concepts even in the early
riod of his life for his immediate practical use in
eryday life. Human life is so complex that even
r the child a considerable amount of short-circuiting
the responses is essential He is forced to form
ncepts and use them, however crude they may be.
ute' often these concepts are erroneous; at any
te, they are not completely accurate from the adult's
int of view. A little boy at school regards the uni-
rsity as a big school. Even adults betray error in
nception when they use certain words incorrectly, as
ey have not understood their meaning exactly. The
ncept of 'sovereignty' in a certain individual's mind
ay include some qualities which are not there, others
sentially there may be left out. The early concept
undoubtedly psychological, but it may not have
ached that accuracy when it may be called definitely
gical.

It is reflective thinking that transforms the psychological concept into the logical one. In a logical concept the denotation and connotation are both exact. Even as adults, we find that we render the connotations and denotations of certain words more and more exact through thinking. The necessity for this is great during the period of education. The more practice in proper thinking a child is given the more his concepts are likely to be rendered exact. "The transformation of the one (psychological concept) into the other (logical concept) is an epitome of the main work of education, so far as the higher thought processes are concerned."[1]

What are the essentials of reflective thinking? And how is that process of thinking to be carried on? The chief condition which gives rise to thought, above the stage of idle thinking, is the presence of some sort of obstruction which the stream of consciousness meets in its movement The analysis of any thought process reveals that there is a problem, simple or complex, the presence of which initiates reflective thinking According to Dewey, in the reflective operation there are: "(*a*) a state of perplexity, hesitation, doubt, and (*b*) an act of search or investigation directed toward bringing to light further facts which serve to corroborate or to nullify the suggested belief."[2]

The presence of a problem gives rise to thought. The mental activity is checked, and the mind is forced

[1] DRIVER: *op cit.* page 206
[2] DEWEY. *op cit*, page 9

to think out the future behaviour in order to ensure the continuity of the activity. Reflective thinking starts at once. The problem may arise in the course of any of our activities It may arise in connection with any of the practical problems of life, or during the course of some theoretical mental gymnastics as thinkers and scholars carry on. When the problem has arisen reflective thinking starts, and goes on until the problem is solved

In the whole act of thinking a certain number of sub-stages may be distinguished. Some have distinguished three, others have differentiated four The first is the mental apprehension of the situation or problem. The second is the arising of the solution, *i e.*, the cropping up of suggestions in order to meet the difficulty. The third is action in accordance with the tentative solution reached Logically the steps may be called apprehension, hypothesis, and verification Drever mentions four phases: (1) 'the understanding of the problem', (2) 'the active following of the clues', (3) 'the suggested hypothetical solution', and (4) 'the deduction of the results' and the verification of the solution obtained

The first necessitates that the problem should be completely presented to the mind. It is not crude apprehension that is sufficient, but there must be a complete comprehension of the problem. Ordinarily this business appears easy, but it must be clear that a thorough understanding of the situation often presents unexpected difficulties The clearer the understanding of the problem the more

is its solution facilitated. In Geometry if the comprehension of the theorem is not properly done the teacher is unable to proceed with the analysis in order to arrive at the proof. Clarity of enunciation is essential, and the statement of what is given and what is exactly to be proved in the theorem must be made before the class. Even in simple matters of practical manipulation,—science experiments, or handwork,—the data must be clearly followed.

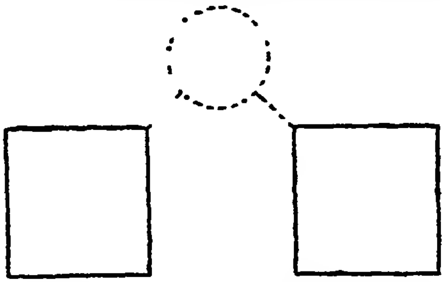
The arising of the solution is the most obscure phase, and the most difficult to explain. But none the less, it is the most interesting. In order to discover the solution of the problem various things begin to strike the mind as a result of previous experiences. It is surprising that ideas from various directions begin to come in like little birds flying to a pot of corn. It is an inductive process, in which the past experiences play the predominant role. They are represented ideally. The suitable ones are selected, others rejected, and the relevant ones applied as far as possible.

Where do they come from, and in what systems do they enter, have been problems for the psychologists. Some undoubtedly are due to memory, and are suggested owing to similarity or contrast. It may be said in behaviouristic terms that the perception revives a certain habit or mode of response. A definitely similar situation experienced in the past hastens the process. Even a partially similar situation helps considerably. The engram complexes resulting

from previous actions, reading, and behaviour in general are of great help. A man of wide reading or experience strikes upon the solution with great facility and ease So often chance happenings, as a casual talk, or certain objects or persons in the vicinity suggest the solution Apart from memory work, that which strike upon the solution must be regarded as the true work of imagination—something which is the result of the constructive and creative ability of the individual mind It may be difficult to determine the clues when we rise higher in the scale of imagination, as for instance, when we begin to find how the 'law of gravitation' struck Newton, or how the 'theory of relativity' flashed on Einstein. But it cannot be said that they were not based on anything that came from the past. Such ideas are undoubtedly comparatively new, but they cannot be said to be absolutely so. The difficulty is only of tracing out how the web has been woven by imagination Some light, however, can be thrown by an examination of the trend of the mental activity of the thinkers during the time when such discoveries are made

In connection with this feat of the mind it is worth considering some of the laws of cognition enunciated by Spearman, which claim to explain the working of the creative mind. The two laws specially important in this connection are: (1) the education or relations, and (2) the education of correlates. The principle of relations says that, "when two or more items (percepts or ideas) are given, a person may perceive them to be in various ways related; thus one may

be near, after, the cause of, or a part of, the other."[1] The law may be represented graphically as below:—



These squares show the two items fundaments, and the dotted circle the relationship

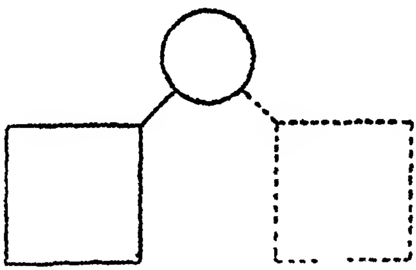
The relations may be 'real' or 'ideal'. The real relations are easy to understand. Spearman points out six such relations (1) Attribution or quality: one thing is a quality of another, as green is or grass, or sweet is of sugar. Attributes are grasped by the mind in the course of sense-perception, and then employed. (2) Identity or sameness (3) Temporal and spatial relations: these relations becomes clear with increased and varied practice in perception. (4) Cause and effect: this relationship, again, is obtained as a result of concrete experiences, *e.g.*, a 'hit' is the cause of 'pain' (5) Objectivity: this is a relationship which holds "between seeing and what is seen, thinking and what is thought about, desiring and what is desired". (6) Constitution: this is a relationship which holds between "constituents and what they constitute; that, for instance, which bread and meat hold to a sandwich".

As regards ideal relations, Spearman has distinguished three. (1) The relation of likeness in its

[1] SPEARMAN: *Creative Mind*, page 18

widest sense—similarity and contrast are both included in this relationship This relationship is at once perceived between two similar objects. Similarity, however, must be distinguished from sameness which has been mentioned before (2) The relation of evidence—It is that whereby we know, that 'the premises of any syllogism warrant its conclusion,' (Only kings wear crowns. A wears a crown, therefore he is a king.) It is the perception of this relationship which helps in all reasoning processes. (3) The conjunctive relation—'It is that which is signified by 'and'' The perception of relationship 'of being together' is easy to grasp, but it is far reaching in its effect.

The second main law, *i.e*, the 'education of correlates' is enunciated thus "When any item and a relation to it are present to mind, then the mind can generate in itself another item so related," in other words, "the presenting of any character together with any relation or relative character tends to evoke immediately a knowing of the correlative character"[1] It may be graphically represented as below:—



The square with complete lines indicates the given

[1] SPEARMAN *op cit*, page 23

item, and the complete circle the relationship between it and the fundament to be discovered. The dotted line square shows the new item thought out.

This law represents the creativeness of the mind of the highest degree. The law operates in very simple situations as well as in very complex ones. A line of a certain length is given, and the subject is asked to imagine another twice that length. He easily does it as the education of correlates operates. He may be given a list of words, *e.g.*, wise, back, darkness, tall, etc., and asked to give their opposites. He does that easily as the law of correlates aids him.

In certain mental exercises the operation of both the laws—(1) of relations, and (2) of correlates—may be seen, as in the answering of the analogies tests, *e.g.*, father is to mother as husband is to......? or eat is to bread as drink is to....? In answering these the subject thinks out the answers 'wife' and 'water' respectively. First of all the mind discovers the relationship between 'father' and 'mother' as of a married couple, according to the law of relations. Having got this, and being given the other item 'husband,' it educes the other correlative item 'wife.'

The springing up of ideas in the mind is more or less a spontaneous process. Excess of deliberation at times may impede the appearance of the right solution. It would be wrong to imagine that creative imagination is under the direct control of volition. The mind cannot be forced to have ideas. It may even be possible that in such moments when the mind seems quite blank the solution of a problem may

be quietly in formation. Fatigue is the most harmful condition for reflective thinking In order to promote thinking during fatigue nothing aids so much as sleep. It is sometimes a useful device to leave for the time being a knotty point whose solution is not easily forthcoming. The unconscious simmering in the mind often brings out the solution unexpectedly.

To return to the thinking process. After the solution of the problem has been deduced the next phase of the thinking process is the verification of the solution arrived at. This means that the solution is to be tested and applied to other cases to confirm its correctness. The verification may be carried out in actual action, or it may be done in the mind It is in the latter case that it definitely represents the completion stage of the thought process. Verification is very often employed by the student of science. Certain opinions or laws are taken up and dissected with a view to testing their validity. For instance, Boyle's Law PV=RT, may be taken and, on the basis of several observations and readings, the truth of the statement may be verified. In science, while the child is made to discover a large amount, he is at the same time made to examine laws and opinions, and verify them with the help of actual observation and experiment.

We have said that in reflective thinking the presence of a problem is necessary There must be some obstacle which the mind wants to surmount, and it is in the interests of this business that it carries on a process of thinking Reflective thinking is

purposive, and reasoning is in essence nothing but purposive thinking. It is reasoning with the help of which belief are established in the mind.

McDougall has distinguished various levels at which beliefs are established (1) Perceptual judgment.—This is the method by which a simple-minded person derives his beliefs. (2) Judgment based on recollection—This is the way in which the memory of certain events confirms our belief in them (3) Judgment based on suggestion.—In this case beliefs are accepted without any scrutiny. It is a typical case of belief without reflection. (4) Judgment based on reasoning—In this, ideas are accepted or rejected after scrutiny and reflection It is for arriving at beliefs in this way that the mind has to do purposive thinking All the four methods of judgment are mental processes, and it would be wrong to place reasoning into a separate class of mental phenomena as some of the old philosophers did. Reasoning is only a higher and specific form of thinking

Thinking—and to be definite and clear, purposive thinking—is what should receive the serious attention of those who consider educational methods and principles. We desire to train boys in thinking, so that they may be able to tackle situations in life in a thoughtful way. Now, since thinking is a purposive mental process, whenever practice in thinking is to be given, the mind must be presented with a problem General instructions on the necessity for thinking are of no avail. It is the presenting of the problem, the obstacle to be surmounted, that arouses thought In order that the

problem or obstacle may really arouse the thinking process in the minds of the children, it must have a meaning for them Unless that is so, it will not carry the process far In other words, we come back to the old principle of interest, which alone is capable of arousing all conative mental activity. Suitable problems for the children according to their age and interest, must be sought and provided That done, the teacher has not to worry about forcing children to think and think

Language

Of the various capacities which man has inherited the power to use some form of language must be regarded as one Even the dumb person makes use of some signs He employs a gesture language for the expression of his ideas But what is it that man inherits? It will be wrong to think that he inherits a knowledge of Sanskrit, Hindi, and English languages He possesses a language capacity which takes a particular form depending on the surroundings in which he is brought up The innate capacity is not perfect at birth, but develops slowly as the vocal organs grow and other intellectual powers mature By saying that man possesses the innate capacity, we only mean that as compared with other animal he is endowed with more efficient physiological apparatus, and also with the intellectual power. A monkey will not be able to learn a language even if brought up in a human surrounding

What is language? It is regarded as the tool of the expression of ideas. Human life is very complex, and constant co-operation between individuals is needed in order to carry on life's tasks successfully. Hence communication of ideas between one person and another is essential. Language is the instrument which aids this inter-communication. This popular conception of the function of language as the tool of expression of thoughts and feelings is not wrong. But it is not the whole thing about language. Psychologically examined, language is not merely the tool of expression; it is also the tool of thinking. It is language that arouses thoughts, feelings, and movements. "Language makes it possible for an individual to guide and control his own thought process."[1]

When we say that language arouses thought we wish to be clear as to the relation between thought and language They are not identical. "While language is not thought it is necessary for thinking as well as for its communication".[2] The process of thinking is not possible without language—language interpreted in the widest sense, as including oral and written speech, gestures, signs, pictures, stone writing, etc. According to Dewey, "anything consciously employed as a sign is, logically, language." In carrying on thinking which is a conceptual process, we do not deal with the objects or things; we deal with their meanings and concepts, with what they signify. To represent these mean-

[1] Collins and Drever: *Experimental Psychology*, page 245
[2] Dewey. *op cit*, page 170

ings and concepts we must have some signs,—they may be words of a language, or any other symbols. Hence language is essential for thinking.

Stout defines language as "an instrument of conceptual analysis and synthesis." Such a meaningful statement needs a little expansion It is language which regulates thought as communicated from one individual to another. Language is composed of a certain number of signs and symbols which we call words Now each of these represents different universal aspects of an experience. When the word 'orange' is used, it represents the result of the concrete experience that we have with an orange There are a number of particular points, *e g.*, round shape, orange colour, sweet taste, etc , which express our particular experiences concerning it. But the word represents the universal aspect of these particular experiences. It is a concept, as we have said before

In the process of inter-communication of ideas, which is done with the help of language, there is conceptual analysis as well as conceptual synthesis. Suppose X says to Y, 'there is an orange in the fruit basket in the dining room' In making this statement, X has represented to Y, a certain experience of his own He has analyzed the experience into the various elements. Some of the elements are: the orange, the fruit basket, the one being in the other, the room, etc. Now, he has a concept of each of these elements, else analysis would be impossible. And this process of analysis is a conceptual one; X

[1] STOUT· *The Groundwork of Psychology*, page 134

may or may not have the concrete situation before him. But this statement made by X, is not the result of conceptual analysis only. Having analyzed the situation mentally, he puts the various conceptual elements in a statement which he delivers to Y. This putting together of the concepts in a logical statement is a process of synthesis. Y, on receiving the statement, *i.e.*, on hearing the remark, reconstructs the situation ideally. X could not verbally communicate his ideas to Y, unless and until the analysis and synthesis could be done. And, the result of this analysis and synthesis could not be expressed were it not for language. Not only this, the words also help in the very acts of analysis and synthesis

This brings us to an important point, which is, that there is a difference between ability to speak and ability to produce sounds A parrot, and in the early stages to a certain extent the child as well, produce sounds A conceptual being when he speaks does not merely utter words but speaks with his mind. Speaking involves some sort of conceptual analysis and synthesis, however crude they may be. In the human child even in early stages both analysis and synthesis are to be noticed, but not of a high standard He utilizes the signs and the symbols, but, psychologically, not so effectively as the adult. The child first analyses situations perceptually. Slowly the concepts begin to be formed, and then conceptual analysis starts. We have already traced the formation of concepts.

It is interesting to trace the development of language in the child. Before the child understands or

uses any words he merely produces some sounds; in other words, he exercises his vocal organs. This is done by the baby when he produces pure vowel sounds like aa, oo, ee, etc., which are expressive only of his feelings. Hunger, fear, comfort, etc, are the emotions to be expressed at this stage He also cries spontaneously This indirectly perfects his vocal organs It is mostly because of this that a dull, sober-looking baby begins to speak later than the restless, oft-crying one. (Of course this is no excuse for making the baby cry) The vowel sounds imperceptibly get combined with consonants, when he begins to cry pa, ma, ba, mum, etc. Apart from the expression of feelings, this sound-production represents expression of needs, and indicates the capability of distinguishing objects and concrete experiences. The mother is recognized, so are various other things, water, milk, etc

The exercise of the vocal organs in such circumstances is pleasure giving, and hence there is often a useless sound-production. But this apparently useless exercise trains the vocal organs of the child for imitating and producing di-syllabic and tri-syllabic sounds Imitation is imperfect in the beginning as the tongue, lips, larynx, etc, cannot work as those of the adult, and the child in imitating sounds mispronounces them 'Bitcut' (बितकुत) is used for 'biscuit,' 'bai'(बाई) for 'bhai' (भाई) 'loti' (लोती) for 'roti', etc A new language is temporarily invented, for instance, 'niny' (निनी) for 'sleep', mumum (ममम) for 'food', 'dudu' (दूदू) for 'milk', 'bhum' (भम) for 'falling', etc. are

used by the child.[1] Some are spoilt forms of true words, others are substitutes, but they all have the origin in the limited capacity for imitation of sound-production. But in this imitative stage, there is a crude understanding of the sound, and mental analysis and synthesis start. The child when he hears 'mumum' (ममम) at once attends, and may even open his mouth for receiving the food article. It must be clearly understood that the child's behaviour is evoked not by the perceptual experience (sight of the food), but by hearing the word which he understands.

But then even higher animals, dogs or monkeys, may behave pretty similarly. They undoubtedly do, but all the while they remain at this level. The human child soon passes over it, and begins to distinguish the general from the particular, and can ideally represent to himself objects not presented to the senses, but merely as conveyed by the vocal symbols which only represent the universal characteristics. He repeats names whenever he sees objects. Sometimes he even gives out the wrong name, as when he calls a 'pin,' a 'nail.' This shows that he notices the structural and functional similarity of the two objects in his crude way.

It is at this stage, that careful observation of objects and association of right words with what they represent, improve the linguistic powers of the child. The vocal symbols which represent the universal

[1] The words mentioned are all Hindi, and refer to sound-production of the Hindi speaking baby.

characteristics are grasped and utilized for further analysis and synthesis. The child first commences with word sentences He analyzes and synthesizes, but instead of using a full statement for the communication of his ideas, uses only a single word or two words. 'Papa bazar', means 'papa please take me to the bazar', etc. It is interesting to note that the child uses the most significant words of the statement With more practice and increase of vocabulary he begins to utilize language for a clearer expression of his analysis and synthesis He then uses complete logical statements

Oral language is not the only instrument for conceptual analysis and synthesis The history of language tells us that man started with gesture and graphic language Gesture was used for communicating the ideas to those who were near spatially Graphic language or picture in stone was used for communicating the ideas to those who followed temporally Besides gestures, cries and yells were also used as expressive signs The cries represented the expression of feelings; and members of certain groups fixed characteristic cries and yells to express various emotions. Systematic sound-production for representing different cognitions, feelings, and strivings of humanity, as constituted a group, gradually arose. The symbols of different groups differed. Thus began to develop vocal languages characteristic of each group, which were passed on through social heritage. The last development was when the vocal and the graphic languages coalesced to give the written language

Human life has been getting more and more civilized and complex, and hence more and more of symbols to facilitate conceptual analysis and synthesis have been needed as time has passed on. Consequently, languages have grown enormously so as to be really effective instruments for carrying on these mental processes. The language of yesterday is insufficient for the needs of to-day, and that of to-day may be found insufficient for the needs of to-morrow. It has to grow To use the Platonic terminologyo, language is not 'being' but 'becoming.' It is a progressive instrument

Many children are found defective in language ability, and it is worthwhile for the teacher to analyze and find out exactly the nature of the defect. In the functioning of language three kinds of processes are involved. (1) "The motor processes involved in producing the signs" These concern both the forms of language, the oral as well as the written. A particular physiological apparatus has to work in order to produce the sound, or write the word. In good speech or writing there is needed a considerable amount of high co-ordination of muscles whether they be muscles of the hand or of the vocal organs. Any inefficiency in this direction leads to weakness in learning as well as in employing the language. Stammering, for instance, is responsible for considerable linguistic disorders. (2) "The sensory processes: (a) representing the receptive side of the language function; and (b) guiding and directing the muscular co-ordinations." The sensory processes involved here are those of seeing and hearing

prominently, and to a certain extent those relating to touch. Deafness or blindness brings about defects which have to be met in special ways But there may be defects in certain phases of the functioning of these organs which may not be so serious, still quite effective so as to call for attention (3) "The interpretive processes, in so far as the language is understood" These refer to the conceptual aspect of the use of language The defect in this direction may be very serious, as in the case of 'congenital aphasia,' where, although there is no deafness or paralysis of the organs of speech, speech fails to appear Again, there may be defects in interpretive processes owing to mental deficiency, and in such cases language will not serve the important function of conceptual analysis and synthesis to the desired degree

References for further reading

1 DEWEY *How We Think*

2 SPEARMAN *Creative Mind*, Chapter III.

3 STOUT. *The Groundwork of Psychology*, Chapters XII and XIII.

4 DREVER· *An Introduction to the Psychology of Education*, Chapter X.

5 COLLINS AND DREVER· *Experimental Psychology*, Chapters XIV and XV.

CHAPTER XII

LEARNING AND HABITS

Learning is the central theme of study in psychology particularly in educational psychology. Every animal is born with a certain number of innate dispositions which determine its responses. But these innate guides to behaviour are not altogether sufficient in the case of man who has to react in a very complex environment. He has gradually to learn to make his responses more suited to the environment in which he lives. He acquires a number of reactions in the course of his life—the greatest amount of learning taking place during the period of immaturity. He does not learn any and every mode of response that falls in his way. He selects certain responses in preference to others, either from the point of view of his personal satisfaction or because of the social ends achieved by the response. Education generally insists on the suitability of the response from the social point of view.

Learning is the process of acquiring the appropriate response. Of the responses A, B, C, D, etc. possible in a situation X, suppose it is only B which brings the activity to a successful termination, others are trials leading to unproductive channels. Now learning means that the individual can resort to B in preference to the other irrelevant responses A, C, D, etc. This may be

achieved in different ways to which correspond the different types of learning Man as compared to the other animals possesses the capacity of selecting and learning quickly the appropriate response without much resort to trial and error although the latter is not altogether absent in his case either

All learning is based on native reactions. Some of the most astounding things a man learns to do have their origin in simple native equipments The human child is initially equipped with crude apparatus for producing sounds and produces only crude sounds But he may learn and gradually develop into a fine musician by the process of modification of the native reaction of sound-production. Modification of native reaction is possible in the case of a human individual both on the effective-conative side as well as the cognitive side Whereas in the case of the native tendencies, a modification produces a mental disposition which yields reactions of great social value, a modification of native capacities expends the possibilities of an individual and makes him as efficient as we see him in his adult life Man, of all animals, is the most capable of learning, he is the most educable.

Learning, as we have said, may take place at different mental levels. It generally involves a modification of both mental and muscular characteristics At some occasions, the role of the mind is not much in evidence For instance, in the art of learning to cycle, it is all a question of learning to "balance", a muscular co-ordination with practically no reference to any deep thought processes At other occasions, the

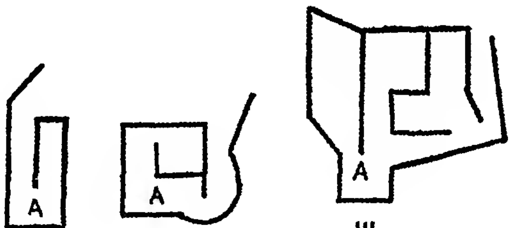
role of the mind is prominent, as for example in learning a new rule in arithmetic. Types of learning are differentiated according to the emphasis found on the mental activity as involved in the learning process. Three types of learning are, accordingly, distinguished—the "trial and error" learning, the "perceptual" or the "insight" learning and the conceptual or ideational learning. In the "trial and error" type, the learning takes place with the minimum of mental activity, no part being played by the higher thought processes. In "perceptual" learning, the part played by the mind is more prominent—a general survey of the situation is made and the salient features are naturally noticed although thinking and reasoning as such do not enter the picture. In the conceptual or ideational type of learning, the mind is in full play—learning takes place on the basis of the individual's capacity for analytic thinking. This last type of learning is possible to human beings only as they alone are endowed with the requisite high order of intelligence. As a matter of fact, intelligence, as generally understood, is involved to a larger or a smaller extent in every type of learning intelligence and learning being associated together; in conceptual learning, however, the part played by intelligence is the most prominent.

Trial and Error Learning.—This is found not only in the case of human beings but in animals low down in the scale of evolution. The well-known psychologist, Thorndike, was the pioneer in experimental work on this type of learning with animals as his subjects, and on the basis of this work, enunciated the well-known

laws of learning associated with his name and to which we shall refer presently.

Thorndike constructed a variety of mazes and puzzle-boxes His procedure was to put the animal in one of these and then to observe how the animal met the situation. The way in which the animal tried to get out of the maze or the puzzle-box, and the nature of the improvement effected in the successive trials provided to the animal, were studied carefully.

Thorndike at first tried his experiments with simple mazes One of these, for example, consisted of books set up *on end with various paths thus formed inside*



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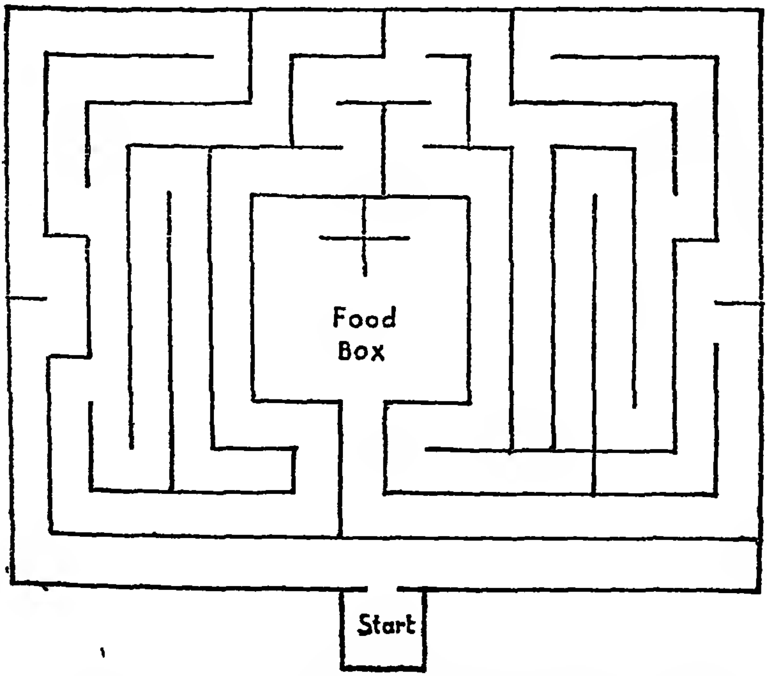
A tiny chick was placed in the maze and left to find his way out Describing the behaviour of the chick, he writes. "When taken away from food and other chick and dropped into the maze, he shows evident signs of discomfort He runs back and forth squeaking loudly, trying to squeeze through any openings there may be, and jumping up to get over the wall "

The chick responds by those acts which in similar conditions in Nature would be likely to free him Some of these acts lead him by chance to a successful per-

formance. Thus in the first few trials, movements are random, the animal runs forwards and backwards in the many pathways of the maze, and may actually cover every inch of the ground before reaching the goal But as successive trials are taken up, the progress that is made is striking, till at last the animal goes straight from the inside of the maze to the outside world

In other experiments, more complicated mazes, such as the well-known, "Hampton-Court" maze and a



Ground Plan of the 'HAMPTON COURT' Maze

variety of puzzle-boxes have been employed. The subjects taken up have also been of a great variety—the favourites being the white rat and the cat

In one of the puzzle-boxes, Thorndike used a cat The cat was placed inside the box, the door of which could be opened with such motor skill as all cats possess, *i e*, the pulling of a string, the lifting of a latch etc Outside the puzzle-box some tempting food served as a lure. Many unsuccessful trials in which the animal attempted to reach through the bars or clawed at the string, were followed by occasional success which became more frequent until the solution got fixed. Gradually all the non-successful impulses were stamped out, and the particular impulses leading to the successful act were stamped in by the resulting pleasure

On the basis of these observations Thorndike enunciated two important Laws of Learning —

I *Law of Effect* —"When a modifiable connection between a situation and a response is made and is accompanied or followed by a satisfying state of affairs, that connection's strength is increased, when made and accompanied or followed by an annoying state of affairs, its strength is decreased"[1] Assuming a bond to be modifiable, it means that it will be rendered strong if satisfaction attends its performance, but if annoyance accompanies it, it will be weakened By modifiable bonds Thorndike means those that can be altered by learning, *i.e*, which are educable As regards satisfaction and annoyance, the predisposing condition of the subject must be taken into account To get food is ordinarily satisfying But there must be hunger, otherwise there will be no satisfyingness Under cer-

[1] THORNDIKE *Educational Psychology*, Vol II, Introduction

tain conditions—when satiated or ill—the animal may even find it annoying.

For men as well as for animals there are so many original satisfiers and annoyers Reward is satisfying, punishment is annoying, and rewards and punishments, whether specifically so called or not, are being constantly used In the narrow sense, rewards and punishments are only sometimes used, but simple praise and blame which amount to nothing but the same, are employed in school in practically every lesson. In this case, satisfaction or annoyance is administered by the teacher. In certain cases satisfaction or annoyance accompanies the very activity itself If while learning a new motor habit, *e.g.*, cycling, success is being achieved, then there is satisfaction, otherwise there is annoyance.

There are primitive annoyers and satisfiers, and the business of education is to replace these by acquired satisfiers and annoyers In a properly trained man, satisfaction gets related to sentiments and the self-regarding sentiment To employ the primitive satisfiers in the hope of making the child learn cannot altogether be justified Rewards in such cases take the form of bribe and must be deprecated

II *Law of Exercise or Laws of Use and Disuse* — Law of use—"When a modifiable connection is made between a situation and a response, that connection's strength is, other things being equal, increased". Law of Disuse—"When a modifiable connection is not made between a situation and a response over a length of time, that connections strength is decreased" A satisfying reaction will be rendered perfect by practice, but ren-

dered useless by not being employed Frequency has thus been emphasized for purposes of learning Learning by doing is fully justified on the basis of this law.

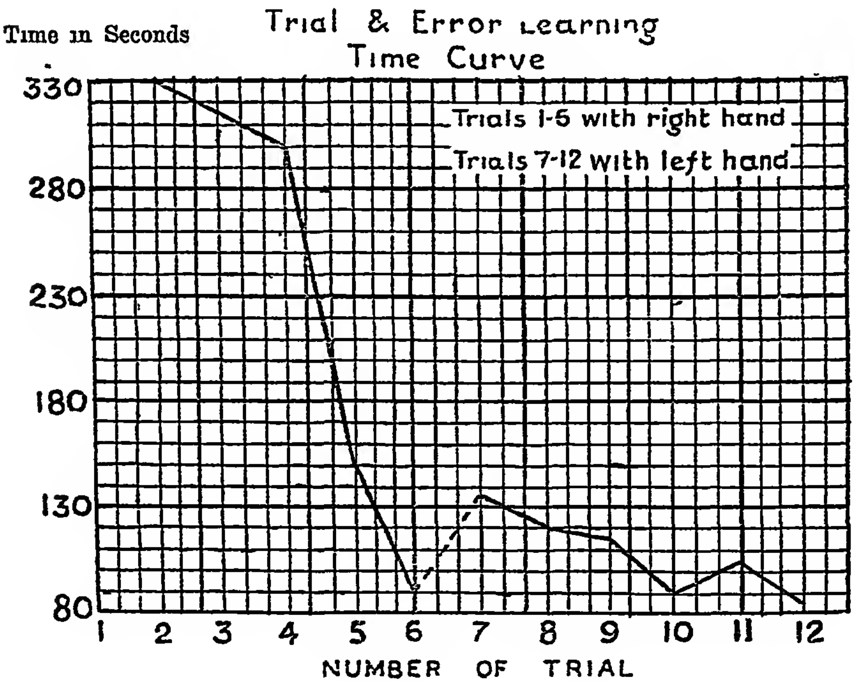
The laws of Effect and Exercise, while separately potent, operate simultaneously in most of our reactions We repeat frequently only the pleasant things that give us satisfaction, and do not at all do so those which are annoying It is necessary for the teacher to note that "mere repetition is useless, there must be pleasure of success, that such satisfaction must not be long delayed; that a single bad habit may hold up a whole learning process, that there must be a general sense of progress" [1]

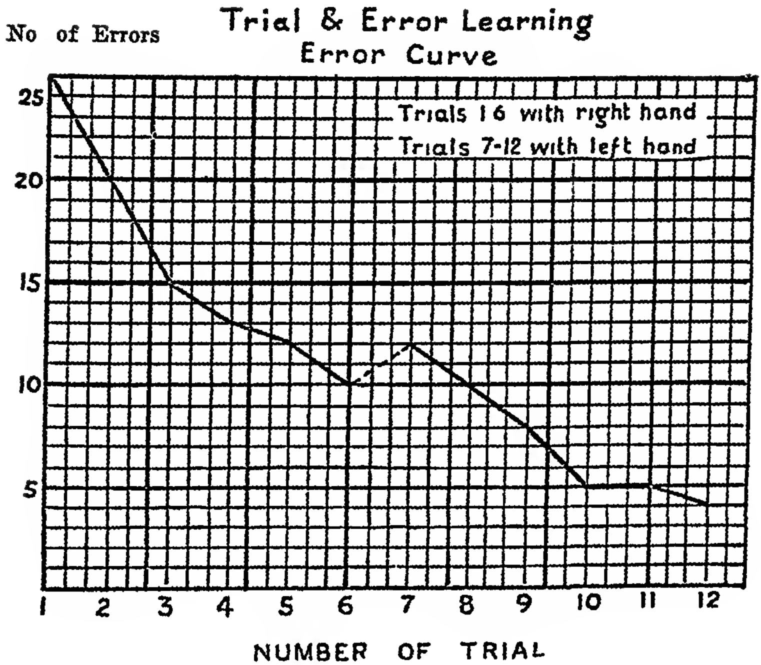
An experimental device for demonstrating trial and error learning in human beings has been suggested by Godfrey Thomson Let an individual try a maze without looking at it. Let a friend read out at each entrance two letters, one indicating a blind alley, the other the correct route, the subject choosing the one between them. The responses in each case are written down and repetitions given until perfection is reached The learning curve (both in time and in errors) is of the same general type as in the case of other animals Says Thomson, "Thus you will have more poignant feelings as to the laws of use and of satisfaction than you would have experienced otherwise".

The mirror-drawing experiment—Introduced by Gopalaswamy[2] also demonstrates trial and error learning, although higher mental processes also play a part in this particular situation The experiment is now classic

[1] G H Thomson· *Instinct, Intelligence and Character*, page 63
[2] Collins and Drever *Experimental Psychology*, Ch XIII

in the psychology of learning. In the experiment, the subject was asked to trace a star-shaped drawing, not looking at it directly, but as it was reflected in a mirror, the movement of the subject's hand being visible in the mirror only and not directly. Gopalaswamy arranged his apparatus so that a record was automatically made of all the movements of the pencil (in this case a stylus) of the subject, as it traced out the pattern. In this way the successive times of tracings and a record of errors was obtained Both the time curve and the error curve show the general characteristics of trial and error learning (Below are given graphs with data from an experiment from the Wall Psychological Laboratory, Government Training College, Allahabad).





Gopalaswamy further analyzed the errors into two groups the lower level of errors which did not involve any novel process on the part of the subject in tracing the shape of the star, and the higher level of errors which involved some novel process and thus provided the subject opportunity to employ his perceptual and conceptual powers He found that the improvement in the higher level responses correlated highly with intelligence and that the improvement in the responses of the lower level did not show much correlation with intelligence The respective share of trial and error and of higher learning is thus evident.

Learning at the perceptual level.—When an orga-

nism displays a level of mental ability higher than that of the mere blind groping, learning takes place on the basis of the perception of the complete situation Gestalt psychologists consider such learning as based on "insight" which they believe to be essential to this type of learning Here the individual does not make many false attempts but he picks up the correct procedure all of a sudden Gestalt psychologists have been pioneers of experimental work in this line Kohler in his book: 'The Mentality of Apes', has described many of his interesting and instructive experiments The following is a typical experiment in which Kohler used six Chimpanzees as the subjects of the experiment The animals were assembled in a room which had smooth unscalable walls. A banana was suspended from the ceiling and a box was put in the middle of the room two or three yards away from the lure All the six chimpanzees leaped repeatedly for the banana, but could not get it Then, one of the chimpanzees, Sultan by name, who had shown himself in the other tests as the most apt, ceased jumping He paced up and down, suddenly stood in front of the box, moved it quickly towards the objective, climbed, jumped and secured the banana, taking only twenty seconds in this final continuous act with the box The other apes acquired the box performace after being shown the same and with some difficulty.

Kohler concludes from such experiments that learning at this particular stage of mental development is more a question of perception than of motor activity and mere trial and error.

Learning at the Conceptual level—In a more difficult situation still, learning at the conceptual level alone may be possible The following experiment of Kohler performed on the chimpanzee, Sultan, illustrates how a complicated situation is difficult to be learnt by a mind which is not developed to the conceptual level

In the room as described in the last experiment, a banana was hung at a height which could not be reached even by jumping from one box A second box was, however, also placed, and the heights were so arranged that the banana could be reached by putting the second box over the first and then jumping from the top of the higher box The following is a condensed account of Sultan's attempt —

"Trial I—After futile attempts at various sorts, he places one box in position, measures the distance with his eyes, does not mount but knocks the box around in a rage Then he fetches the other box but instead of placing it on the first, he does various things with it, placing it beside the first, and holding it up in the air towards the lure He becomes enraged again, runs about the room dragging the box, discards it, and tries other objects A complete failure.

"Trial 2—Nothing is present except the two boxes and the suspended banana He places one box, mounts, sits down again Grabs the second box, runs round the room in a rage, comes to a halt, drags the second box to the first, places it on top, mounts, but does not jump The lure is still too high

"Trial 3—The fruit is hung somewhat lower, but he pays no attention to the boxes, as if discouraged by

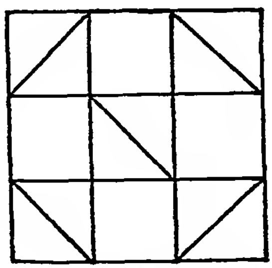
his previous failure. The experimenter now places the boxes in position, and the ape mounts and obtains the fruit.

"Trial 4—The ape stacks the two boxes but not under the lure; instead he places them in the exact spot where his first two-box structure had been erected (the lure had been moved).

"A later trial—Sultan places one box in position, brings the second box, seems uncertain what to do with it, suddenly lifts it and places it on the first box and obtains the reward."

Thus it was with difficulty that the ape could learn how to handle the situation The experiment clearly shows the difficulty of learning of a conceptual variety when only a perceptual level of intelligence is available.

With human subjects, learning at a conceptual level has been experimented upon in recent times[1] with a great



a unicursal puzzle

variety of puzzles,—linguistic, mathematical, logical and mechanical. In one of the experiments a unicursal puzzle was used. Each subject was provided with several

[1] WOODWORTH: *Experimental Psychology*, page 768.

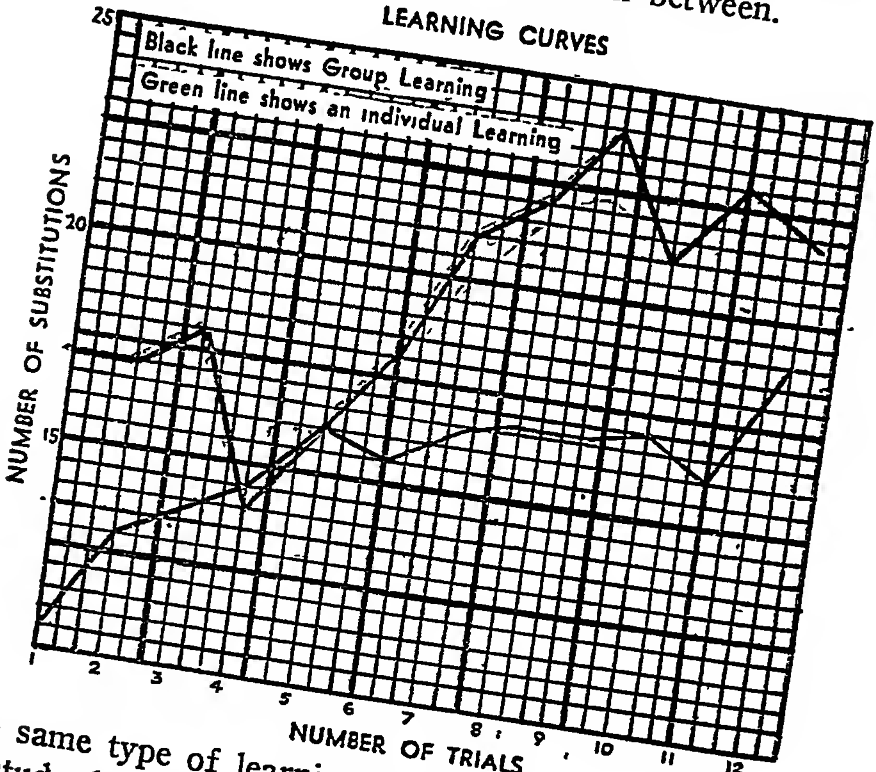
copies of this puzzle to be traced without repeating any line or taking the pencil off the paper. The younger children, when they succeeded, did so by a long series of slight variations with gradual exclusion of erroneous movements. Older persons made quicker shifts and wider variations. Asked for an introspective accounts they reported methods which differed greatly from one subject to another Some started to draw with no preliminary examination of the puzzle, others analyzed the visible puzzle but used no abstract concepts, others made use of some sort of logical reasonings.

In another experiment of this type, college students were asked, one at a time, to tie two strings together which were hanging from the ceiling far enough apart so that they could not both be reached at the same time, even though the subject kept one in his hand and walked as far as he could towards the other A few subjects solved the problem at once For the others, the experimenter walked into one of the strings, leaving it swaying a little. To a few more subjects the string thus became a pendulum They immediately tied a weight on the end and swung it until they could reach it while holding the other string.

It will thus be seen that in the case of human individuals learning *may* take place at various levels of intelligence, and in any particular learning situation it may not always be possible to distinguish the type of mental activity involved.

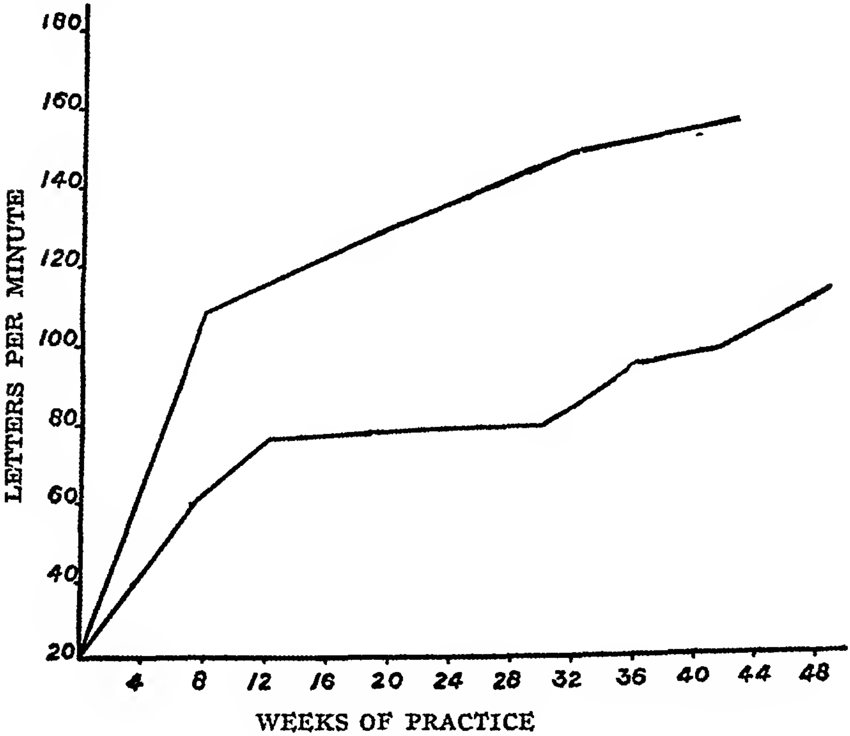
A common laboratory experiment in which the various stages of a learning process are clearly brought out is the learning by the method of substitution A

haphazard series of alphabets is provided, and a key letter is given at the top. The subject has to proceed putting down corresponding numbers below the alphabets as quickly as possible, 30 seconds periods of work and rest alternate. A typical learning curve is obtained, with gradual and steady increase in the rate of substitutions with plateaus interspersed in between.



The same type of learning curves are obtained when we study the actual learning of an art by an individual. Below is given the learning curve obtained by Bryan and Hater from the study of the results of learning

telegraphy. The subjects who practised telegraphy were given tests every week in order to determine their speed in sending messages as well as receiving them. The unit of measurement consisted of the number of letters sent or received per minute



A study of these learning graphs leads to some conclusions which have an educational bearing:—

(*a*) The rate of improvement made by the subject is not constant. The curves are steep in the beginning, consequently a very rapid progress is made in the earlier stage of learning. After this the progress becomes slow When anything is to be learnt, practice

pays a good deal. But in practising any new skill, repetitions in the beginning are very useful. Earlier practice gives a good deal of improvement. Hence, it is necessary for the teacher to give a good deal of practice in a new skill in the beginning. In the early stages when children are given a good deal of practice in copywriting they make marked progress and after that no such rapid progress is made. Hence, in higher stages no further special practice in transcription and copywriting is given.

(*b*) After a certain amount of progress has been made there is reached a level of attainment at which progress is at a standstill. The stage has been called the 'plateau of learning'. It indicates that the maximum progress for the time being has been made. No random practice is of any avail under such circumstances. Not only that, the learner may feel discouraged and disappointed. It is not difficult for the teacher to know that his class has reached the plateau, and then he has to adopt some special devices to spur the children. Some boys with effort will rise above the plateau, and may even show a sudden progress having crossed the stage of despair. For others, probably it represents the maximum output of which they are capable, and nothing will be of any avail to get further progress.

Habits

The problem of habit is connected with learning. The formation of a habit is definitely one form of the learning process. But while the psychological features

of the two processes are so similar they are not quite identical. The amount of attention needed at different stages of habit-formation is not constant. When the start for forming a new habit is made the individual has to be all attention. Dressing and undressing, walking, standing, writing all habitual actions, and when learnt are done without any attention on the part of the individual. But in the initial stages of learning them the person has to attend very carefully. After having performed the action once or twice or more the amount of attention is lessened, till at last it is performed after the fashion of a reflex act. For instance in learning to put the knot of a bow-tie one has to attend carefully when doing it first, after practice no attention is needed.

Habit formation is necessary for our mental life which would become an almost impossible affair if we had to devote all our attention to some of the element-ary processes like dressing, walking, behaving in a mannerly way etc Man has to respond, in such a complex environment that it is essential for him to learn certain modes of reaction, so that he may be able to perform some of the actions quite mechanically and without waste of time

NATURE OF HABIT

The term habit has been rather widely used and it is necessary that we should settle the nature and scope of what we understand by this term Some have called man 'a creature of habits'. According to them, an individual's character is regarded as nothing but a bundle

of habits which he has formed. All good or bad actions are performed by him according as the type of habits he has formed. Now, if habits are understood so widely as to include a man's entire behaviour, then a question may be raised as to whether an individual should be allowed to become a creature of habits, or be brought up to act in a free way. To avoid any confusion, we shall define habits as constituting only those acts which we learn to perform with little or no thought and which we carry on more or less in the same manner every time.

Habit has been understood as referring not merely to a fixed tendency to respond to a stimulus in a particular way, but it is sometimes also taken to mean an organism's characteristic mode of growth and function. We speak of the habits of man, of animals, and of the plants as well. From this point of view, instincts can be called racial habits. Thus habit may refer to an innate mode of response. We wish to be clear that we understand habits as definitely acquired modes of response. They are not inborn, but learnt as a result of the influence of the environment in which the individual lives Habits may be said to arise in the service of instincts when the conditions are more or less uniform Their formation in centain cases depends upon instincts as in the case of a child acquiring an attitude of love or fear for certain animals. A cat being a furry animal frightens the child, but gradually an attitude of liking may be acquired for the cat and the fear may be suppressed. In another case the fear may be aggravated. Although in many cases habits are connected

with instincts, it would be wrong to say that all habits can be traced to instinctive reactions.

Habits are modes of reactions which are fixed. They tend to crystalize an individual's behaviour forcing him to respond in a fixed way, without letting his intelligence choose and decide upon the most appropriate response. And, since intelligence means that mental capacity of an individual which help him to adapt himself to new stuations as they arise, we may say that habits go against intelligence But while this is so, habits have an important place in life. They economize effort, and prevent an expenditure of mental energy leaving it free to be utilized for higher and more useful mental activity A habitual action is not at all straining, hence the mind may be free to carry on another useful activity. We think over various things while we dress or do any such habitual act We may solve a problem while having our bath or shave

Formation of Habits

There was a time when the word 'habit' was associated only with undesirable modes of conduct, *e g*, smoking, drinking, etc But habits, being acquired reactions depending upon the play of the environment, may be good as well as bad The school, of course, aims at the formation of good ones Every individual must learn to carry on certain tasks automatically, and these must be socially permissible. Children have to be trained in good manners, and in doing so many other useful things in a habitual way

James has laid down a certain number of laws or maxims which he regards essential for the formation of a habit.

(*a*) Whenever a new habit is to be formed or an existing one to be discarded, one must 'launch oneself with as strong and decided an initiative as possible'. All possible circumstances which will help the necessary action must be taken advantage of. In the initial stage of forming a habit the individual has to give all possible attention to the activity. James advocates the necessity of gathering all such circumstances as would encourage the new mode of activity in getting fixed up. Every action which needs to be habituated or to be given up needs to be treated in a different way. Taking an oath may help in one case, entering into a contract with a friend may help in another. Avoiding certain things in the environment is often very helpful in the case of giving up an old habit In general, the new habit must be commenced with a determination—in other words, well begun.

(*b*) 'Never suffer an exception to occur till the new habit is surely rooted in your life'. Lapses should not be allowed to occur. A slip now and then does not ordinarily appear to be of great magnitude, but it is a break in the continuity of training, and is liable to undo much which may have been achieved by considerable practice

(*c*) 'Size the very first possible opportunity to act on every resolution you make, and on every emotional prompting you may experience in the direction of the habits you aspire to gain'. Actual opportunities of acting

must be utilized. This law reinforces the first. The resolution of acting being there, no opportunity of acting should be missed, because the greater the repetition the more does the muscular and the nervous system get set to act in the particular way.

(*d*) 'Keep the faculty of effort alive in you by a gratuitous exercise everyday'. As James puts it, "be systematically heroic in little unnecessary points, do everyday or two something for no other reason than its difficulty so that when the hour of dire need draws nigh, it may not find you unnerved and untrained to stand the test". Gratuitous exercise may not be profitable at the moment but it ensures the desired type of conduct when later there is need of it.

James puts forward another useful principle in connection with habit formation. "Don't preach too much to your pupils or abound in good talk in the abstract." We have time and again emphasized the importance of 'learning by doing.' The principle is important, whether the matter has reference to teaching or training The value of virtues and moral traits is never impressed on children by giving them abstract talks on their usefulness, but by making them actually partake in simple activities where these traits have to be used. Suitable opportunities arise both in the classroom and outside it, and the teacher must promptly seize them in order to train the children to think, to feel and to act rightly

In conclusion, we note that habit-formation is essential in order to economize effort from the point of view of modifiability and adaption it may be regarded

as disadvantageous It definitely reduces the plasti of an individual, and hence his educability And, unluckily some wrong habits have got formed the p tion is worse still. If a wrong method of holding pen has been adopted by the child it requires gr effort to modify his habit and correct it. Older peo have greater difficulty in learning things, partly beca of the gradual diminishing of their learning pow but due largely to the man's habits which have formed and which interfere with their learning. certain amount of plasticity, therefore, must be characteristic of every individual.

An individual left to himself would form so habits, and they may be of the right or wrong ty The school therefore has to interest itself in the mat and regard the inculcation of good habits as one of tasks. But in doing so, it has to see that the individu plasticity is maintained to a desirable extent would not, however, subscribe ourselves to any extre view on the question, such as advocated by Rouss when he states 'The only habit I would teach (Emile) is the habit of forming none.'

References for further reading

1 WOODWORTH: *Psychology* Chapter XIII.

2 WOODWORTH: *Experimental Psychology* Chapters VI, VII and XXIX.

3 SANDIFORD: *Educational Psychology* Chapters X and XI.

4 JAMES: *Psychology Briefer Course*, Chapter X.

5 KENNEDY· TRASER. *The Psychology of Education*, Section III, Chapters II and III.

6 GODFREY H. THOMSON. *Instinct, Intelligence and Character* Chapters VII and VIII.

7 WOODBOURNE: *Human Nature and Education* Chapters VI and VII.

8 KOHLER· *The Mentality of Apes.*

CHAPTER XIII
INTELLIGENCE TESTING

ONE of the achievements of modern educational psychology is the development of standardized tests for measuring the mental ability of children. The last three decades constitute the period of the most notable research in this direction. Apart from designing tests for measuring mental ability, the nature of intelligence has also been investigated, so as to tell us exactly what mental trait is measured with the help of these newly designed devices. This has opened up a vast field of highly technical and successful research—known as 'Factor Analysis'—which has attempted to review the very foundations of at least the cognitive psychology in terms of different abilities or factors.[1] The teacher can obtain considerable help from these tests in the matter of classifying his pupils, and also in adjusting instruction to the needs of individuals. It is necessary for him to know that every individual is endowed with natural abilities to a particular extent, and his response to the environment is possible only to the extent warranted by his native powers.

There is hardly any civilized country where research work in intelligence testing has not been done.

[1] G. H THOMSON: *The Factorial Analysis of Human Ability* (London, 1939).

C. BURT: *The Factors of the Mind* (London, 1940).

L. L THURSTONE: *Primary Mental Abilities* (Chicago, 1938).

The tests which have been designed have been put to test, and after being the subject of experiment with thousands of children have been standardized. The results of experiments have been scientifically interpreted with the help of certain statistical devices. Qualitative conclusions can be rendered scientific only when a quantitative basis has been found for them. The extent of reliability of tests has been quantitatively measured. Tests have been quantitatively compared one with another Their relationship with other qualities and ahievements of the child has also been determined. Before giving an account of the tests, we shall briefly discuss one of the chief mathematical devices employed in the field of mental measurement

CORRELATION

The device adopted for measuring the correspondence between various abilities or one ability and another is called correlation. It has been defined as "the tendency towards concomitant variation," and the coefficient of correlation is nothing but the measure of such a tendency. "Whatever phenomenon varies in any manner whenever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation."[1] In statistics correlation means expressing the relationship between the two abilities in a mathematical form.

[1] BROWN AND THOMSON. *Essentials of Mental Measurement*, page 97.

Correlation became a subject of interest to the psychologist when an attempt was made to find a relationship between the brain and intelligence. One of the ancient ways of getting a measure of intelligence was by obtaining some idea of the size of the brain, in other words, by measuring the size of the head. The bigger the head the greater was the intelligence Not only the size, but the shape of the head also was supposed to be an indication of the type of intelligence Prof. Karl Pearson making use of the device of correlation disproved the view of the relation of the size of the head to intelligence

Th degree of correspondence, or the coefficient of correlation, is computed with the help of certain formulæ. We shall treat these with the help of suitable illustrations, but a mathematical treatment of the bases of the formulæ is not possible here The interested student may study the original writings of the workers in this field.

Suppose there are ten boys A, B, C, D .... I, J in a class. They are given a test X by the teacher, and obtain the marks 21, 19, 17, 15, 13, 11, 9, 7, 5, 3 respectively, and thus secure the positions first to tenth in regular order. The same ten boys are then given another test Y; and suppose it is found that the boys A, B, C, D .... I, J get the very same marks 21, 19 .... 5, 3, and come out in the same order first, second, ... ninth, tenth. We shall then say that the correspondence between the two is perfect, and the series of achievements proceed in the same direction A boy who does

well, or ill, in test X, does well, or ill, in Y also Not only does he do well, or ill, but does equally so In such a case the correlation between the two is positive and perfect, and is represented by the quantity $+1$ Now suppose that, in the test Y, instead of the boys obtaining the same marks and retaining their old positions, the whole order is reversed, *i e* A gets 3 marks and stands tenth, B gets 5 and stands ninth, and so on, J standing first. In this case a boy who does well in X does equally badly in Y, and another who does badly in X does equally well in Y. The correlation between the two series here is negative and perfect, and is represented by the quantity -1

When the correlation is positive or negative, given the achievement in one test, it is possible to predict the probable achievement in the other. The coefficient of correlation may be any quantity between the limits $+1$ and -1. When the correlation happens to be zero, prediction becomes impossible It is left entirely to chance. We cannot say whether boys doing well in X, will do well, or badly, in Y. An arrangement or orders in the two series X and Y as given below, tends to give a correlation nearly zero.—

Names	A	B	C	D	E	F	G	H	I	J
Order in series X	1	2	3	4	5	6	7	8	9	10
Order in series Y	5	6	2	7	8	10	1	4	9	3

(I) *Calculation of Rank Correlation*

This method is useful when the ranks alone of the children in the two tests are given If marks are given and rank correlation is to be found, then the marks must be arranged in decreasing order and the rank of each individual obtained. We shall use marks and arrange them in ranks.

Names	Test X		Test Y		Difference in rank	Square of difference
	Marks	Rank	Marks	Rank		
A	25	1	27	2	—1	1
B	22	2	30	1	1	1
C	20	3	23	3	0	0
D	18	4	15	5	—1	1
E	17	5	13	6	—1	1
F	15	6	9	8	—2	4
G	13	7	19	4	3	9
H	12	8	1	10	—2	4
I	8	9	10	7	2	4
J	5	10	6	9	1	1
					Total of squares of differences	26

Rank correlation (denoted by the letter ρ)

$$= 1 - \frac{6\Sigma D^2}{N(N^2-1)}$$

Where ΣD^2 stands for the sum-total of squares of differences, and N represents the number of cases.

Therefore $$\rho = 1 - \frac{6 \times 26}{10 \times 99}$$
$$= 1 - \cdot 158.$$
$$= \cdot 84$$ correct to two places of decimals.

The above formula is called Spearman's foot-rule formula.

(2) *Calculation of coefficient of correlation by the product-moment method*

Suppose the marks of the boys in the tests X and Y are —

Names	A	B	C	D	E	F	G	H	I	J
Marks in X	27	23	20	18	17	15	13	12	9	7
„ „ Y	27	29	23	15	13	9	19	1	10	6

The mean of the marks (arithmetical average) of the series X is 16, that of Y is 15

X Series			Y Series			
Marks	Difference with the mean (16), denoted by x	Square of the difference, i e, x^2	Marks	Difference with the mean (15), denoted by y	Square of the difference, i e, y^2	Product of the two differences x and y, i e, xy
26	10	100	25	10	100	100
23	7	49	29	14	196	98
20	4	16	23	8	64	32
18	2	4	15	0	0	0
17	1	1	13	—2	4	—2
15	—1	1	9	—6	36	6
13	—3	9	19	4	16	—12
12	—4	16	1	—14	196	56
9	—7	49	10	—5	25	35
7	—9	81	6	—9	81	81
	Total x^2	=326		Total y^2	=718	Total xy =394

Coefficient of correlation (represented by the letter r)

$$= \frac{\Sigma xy}{\sqrt{\Sigma x^2 \times \Sigma y^2}}$$

$$\therefore r = \frac{394}{\sqrt{718 \times 326}}$$

$= \cdot 82$ correct to two places of decimals.

The above formula is called the Bravais-Pearson product-moment formula.

The coefficient of correlation can also be calculated by obtaining the product-moment coefficient by grouping and diagonal adding, as suggested by Godfrey H. Thomson.[1] The number of cases taken in the examples solved above is ten. Such a number is very small. For the values of the coefficients of correlations to be valuable the number of cases must be at least thirty.

History of Intelligence Testing

With the development of experimental and individual psychology, the attention both of psychologists and educationists was drawn to the study of the powers of the child—the powers which constituted the initial equipment of the individual, and which formed the basis of his self-expression. What these mental powers were, and how they could be measured, were the problems tackled.

[1] See Thomson: *How to Calculate Correlations*, pages 14-17.

Some crude and arbitrary methods of judging an individual's capacities had been tried for a long time. Individual differences had been recognized from the earliest times, but the nature of the differences was not clearly understood till very recently. The wise man was distinguished from the fool, but little could one say as to what wisdom consisted in. Wisdom was regarded as the sum-total of one's knowledge, and consequently knowledge and wisdom were synonymous. In this sense, a fool was one who had not been educated and equipped with knowledge. Gradually, it became recognized that a distinction should be made between an individual's intellectual capacity and his fund of knowledge, and psychologists took upon themselves the task of the study of intellectual capacity. A person's knowledge (a result of education) was, and is still, tested by varying systems of examinations. Some means had to be devised for testing the intellectual capacity which made education possible.

The first attempt made was to test the mental capacity by external and physical signs Sometime in the eighteenth century Lavater brought to light a certain number of physical criteria as indicators of ability He examined many of the traditional sayings and recorded his observations on the physiognomy of many individuals. According to him, a man's abilities could be predicted by looking at his face. In this country also, physical features have been taken as expressions of the mental powers, as is accounted by adages of the type, कश्चित् दन्तुर्भवेन्मुर्खः (one with big projecting teeth is rarely a fool). The eyes, the fore-

head, the nose have all been taken as giving some idea of one's intelligence. A little after Lavater's time, Gall propounded his system of phrenology. The criminologist Lombroso also held the view that certain malformations of the head and face were distinct indicators of mental as well as of emotional deficiency. "Small, mis-shapen, or asymmetrical skulls, low, narrow and bossed foreheads, broad, depressed or upturned noses, narrow, high or V-shaped palates, lobless, projecting or crumpled ears, these and many similar anatomical anomalies were thought to indicate a reversion to come low and primitive type."[1]

It was the work of Karl Pearson that shook the faith of the scientist in placing full reliance in the shape of head as indicating intelligence He took the measurements of the skulls of 5000 school children, and 1000 undergraduates, and found that the degree of correlation between intelligence and the measurements of the skull worked out to be very low. Intelligence could not be predicted on the basis of the size and shape of the head. While phrenology and physiognomy do not offer at present any reliable criteria in the eyes of the psychologist, it cannot be said that their influence is absolutely discounted. 'So and so looks intelligent, or otherwise,' is what one would most unhesitatingly state without fear of being regarded as altogether unmodern.

During the close of the last century, another line of attack for measuring intelligence was adopted, and that was by making use of simple sensory tests. It

[1] *Psychological Tests of Educable Capacity*, page 3.

was thought that the sensory acuity of an individual gave an indication of his mental capacity. The psychologists felt that while all individuals were endowed with the same physiological sense-organs, they differed in so far as their discriminaton of the stimuli was concerned. This discrimination, according to them, depended upon attentive analysis, and this power of attentive analysis was identified with mental capacity Thus mental capacity was measured in terms of sensory discrimination

Both, lower senses like touch, as well as the higher ones like vision and hearing, were put to test. In certain cases correlations between sensory discrimination and mental ability seemed to be fairly high Auditory discrimination particularly appeared to be highly correlated, probably owing to the fact that the development of the higher intellectual powers depended upon speech, which in turn depended upon hearing. Later researches with the deaf and dumb do not, however, substantiate such a view. So far as the lower senses are concerned young children are almost as sensitive as older ones Also, there is no particular difference between the dull and the bright children, or between savages and civilized men.

The next development was to measure mental capacity with the help of motor tests Since, in psychology, emphasis began to be laid on the active processes of the mind, it was thought that measurement of movement would give a better evaluation of mental capacity than measurement of sensation. The more

quickly one could react or respond to a stimulus the more intelligent one was. Some investigators, *e.g.*, Gilbert, found a higher correlation between speed of reaction and intelligence, than between intelligence and sensory discrimination. Others, *e.g.*, Binet, discovered that intellectual capacity correlated poorly with the speed of reaction. The chief means employed were: (1) the tapping experiment, in which is measured the number of taps that one can give per minute on the tapping machine, and (2) the dynamometer experiment, in which is measured the subject's power of gripping.

The psychologists next supplemented these tests of sensation and movement which had a physical basis by simple test of memory, attention, association, etc. But the mental operations used were of a very elementary order. Meanwhile the problem of the transfer of training was tackled by Thorndike; and investigations in this direction threw some light on the problem of mental testing as well. Mind was previously supposed to be made up of a certain number of faculties, *e.g.*, perception, memory, attention, etc., and hence simple tests were designed to measure each one of these to get the sum-total of the mental capacity. Perception was measured by crossing out letters (a, e, or any other) over a printed page or two; memory was measured by the ability to reproduce certain given numbers; and so on. Thorndike and Woodworth succeeded in showing that very low or no correlation was found between test of one and the same function. Again, training in one mental activity produced no influence

on the other, except in so fas as the effect of improved methods of attack was concerned.[1]

In the older investigations, the evaluation in most cases was qualitative as well as subjective. The investigators often worked on the basis of opinion and inspection. For an index of intelligence such criteria as teachers' opinions, general impression, etc, were relied upon As time passed, measurements were made definitely quantitative, and conclusions, as warranted by quantitative data, were regarded as reliable The objective element became more important than the subjective.

To this point intelligence had been measured by means of simple sensory, or motor, or even mental tests of an elementary character. But, it was argued that intelligence could be measured more definitely by testing higher mental operations, like reasoning, detecting absurdities, tracing meanings, noticing logical relations, selecting the best solution, and so on. "The higher and more complex the activity tested, the closer was the correlation with intelligence" Pioneer work was done by Binet in France during the early years of this century Binet's tests, which we shall presently discuss, were meant to be applied individually. Since then, group tests for measuring a large number of persons together have also been designed Work in intelligence testing has spread on a large scale in Britain, and other countries of Europe, and in America A beginning has also been made in this country. We

[1] See Chapter IX, page 291

shall deal briefly with the important types of tests lately designed. But before describing the tests and commenting upon them, we shall consider the nature of intelligence.

THE NATURE OF INTELLIGENCE

Besides the designing of various types of tests for measuring intelligence, investigations have also been carried on to find out the nature of intelligence. What is it that the intelligence tests attempt to measure? Or, what is it that they ought to measure? At the outset it should be borne in mind that the intelligence tests do not measure acquired attainments but innate ability. Again, they cover primarily the inellectual activities of the mind as differentiated from those which are emotional. They do not measure the influence of will, feeling, etc, and thus give no idea of one's character.

So many meanings have been given to intelligence that it is very difficult to say what it exactly stands for Various theories have been advanced, and they differ from one another in certain fundamentals. Several attempts have been made to mobilize the opinions of expert psychologists on the question; but neither the British symposium of 1910, nor the American of 1921, nor the International Congress of 1923, have succeeded in settling the question. The discussions, however, have brought to light more and more clearly what the different schools stand for.

Intelligence has been variedly defined, but one thing about it is certain. It is an individual's

innate quality. Some individuals are born clever, others stupid. Human beings are more intelligent than the higher animals, and the higher animals are more so compared with the lower ones An examination of the various definitions makes it clear that certain characteristics of an intelligent person are accepted by almost all schools of thought. An intelligent person adapts himself sooner and more correctly to a novel situation than a less gifted one, again, the intelligent individual is capable of carrying on higher processes of the mind better than the stupied one The more intelligent the individual the more efficiently he can carry on the higher thought processes like, comprehension, analysis, synthesis, classification, reasoning, etc Another mark of intelligence is the capacity to learn The intelligent individual learns more quickly, and keeps a hold on what he learns for a longer time His mental system integrates easily, and tenaciously

According to Ballard, the various opinions on the nature of intelligence can be grouped under three heads. "(1) those that regard intelligence as a single ability common to all intellectual processes; (2) those that regard it as a group of two or three abilities of varying degrees of generality, and (3) those that regard it as representing no real entity but as merely a convenient term for the average of all specific abilities "[1] We shall discuss these, but not in order as above

The second theory, according to which intelligence may be regarded as being made up of a certain

[1] BALLARD. *Group Tests of Intelligence*, page 135

number of abilities, was held by Binet. Binet believed in some sort of faculties of the mind, and consequently he designed tests for preception, memory, attention, etc The three important abilities which, according to Binet, constituted intelligence were: (1) the comprehending of a problem, directing the mind to its solution, and maintaining the attention to it; (2) the ability to adapt the mind to the needs of the situation; and (3) the capacity for auto-criticism Some others who hold the group factor theory maintain that the important abilities are two (1) concentrating the attention, and (2) exhibiting general cleverness.

The third theory, which regards inelligence as the average of several independent traits, has been advanced by Thorndike He regards intelligence as representing the whole lot of innate mental abilities. These traits, while different, are related in varying degrees "Having a large measure of one good quality increases the probability that one will have more than the average of any other good quality." He maintains that the result of a test in one direction could predict the possibilities in other directions also; but he make it clear that no one test need be taken as having measured the general ability.

Allied with this theory is Godfrey H. Thomson's 'sampling theory of ability.' According to this, the mind of each man is a sample group of qualities, like Mendelian units which come to him by heredity. In the execution of any mental activity, (*e g*, solving an intelligence test) there are a number of qualities which are at play, and those qualities which the individual

employs in the particular exercise, are just a sample of the lot that he possesses.

The first theory, which is called the theory of the 'central intellective factor,' maintains Stern's definition · "general adaptability to the new problems and conditions of life." According to Burt, general intelligence while it expresses itself in various ways, is a single complex quality, and not a sum-total of a large number of independent traits He defines it as, "all round mental efficiency" It is best measured through tasks which require volitional attention, quick and accurate grasp of situations, relations, correlates, and reasoning These are thus the various ways in which it manifests itself. Spearman also may be said to be associated with this theory of general ability. He uses the symbol 'g' for representing the central factor or general ability. He does not say that 'g' is synonymous with general intelligence According to his theory, 'g' represents an individual's sum-total of mental energy which while it manifests itself in different ways, is fixed for every individual Each individual's output, however varying in quality, is fixed in quantity.

Spearman's theory needs a little fuller discussion. It is better known as the 'two factor theory' Spearman holds that, "all branches of intellectual activity have in common one fundamental function (or group of functions), whereas the remaning or specific elements seem in every case to be wholly different from that in all the others"[1] As mentioned above he labels the

[1] See *American Journal of Psychology*, Volume XV

general factor common to all activities as 'g', and uses 's' to represent the specific factor characteristic of the particular activity. This means that there are as many 'c's' as there are activities. For the same individual, 'g' is constant and operates in any activity that he carries on. If, for instance, an individual carries on two activities, one 'arithmetical' and the other 'linguistic.' then his 'g' operates in both of these and contributes in producing a certain amount of performance: but in the former there is a specific factor, says 's_1' inherent in the activity, and it may be called 'arithmetical capacity,' while in the latter there is another different specific factor 's_2' the 'linguistic capacity.' It is just possible that 's_1' and 's_2' may differ very much from one another in their amounts in the same individual, and thus bring about variations in the performances in the two directions. But while the performances in different directions vary, they tend to show varying degrees of positive correlation And it is this 'g', the central factor, which is responsible for that positive correlation

According to Spearman, the evidence of the existence of 'g' is to be found in the tetrad equation, a relationship obtained after a prolonged mathematical research with observed correlations:

$$r_{ap} \times r_{bq} - r_{aq} \times r_{bp} = 0$$

(r stands in the above for any correlation, while the sub-scripts ap, bq, etc., represent the two abilities—tests, class marks, etc)

The following table[1] of correlations from Spearman will make the point clear:—

	Opposites	Completion	Memory	Discrimination	Cancellation
Opposites ..		·80	60	·30	30
Completion	80	..	·48	·24	24
Memory ..	·60	·48		·18	·18
Discrimination .	·30	·24	·18		·09
Cancellation .	·30	·24	·18	·09	.

Let a denote opposites, b discrimination, p completion, and q cancellation; then r_{ap} =·80, r_{bp} =·09, r_{aq} =·30, and r_{bq} =·24 The tetrad equation becomes ·80×·09—·30×·24, which is equal to ·0720—·0720 or zero. Any other set of correlations treated as above will tend to show that the tetrad equation holds

If any table of correlations (not hypothetical, but observed) is taken and the tetrad equation is tried out, it will hold good. This can be tested by observation Spearman holds that, "this equation between the correlations bears upon the individual measurements of correlated abilities ..... Whenever the tetrad equation holds throughout any table of correlations, and only when it does so, then every individual measurement of every ability (or of ay other variable

[1] SPEARMAN *The Abilities of Man*, page 74

that enters into the table) can be divided[1] into two independent parts which possess the following momentous properties. The one part .... general factor 'g' ..... , although varying freely from individual to individual, remains the same for any one individual in respect of all the correlated abilities. The second .... the specific factor 's' ...., not only varies from individual to individual, but even for any one individual from each ability to another."

According to the above, the score of any individual 'x' in any test say 'a', which may be denoted by M_{ax} can be represented as in the following equation:—

$$M = r_{ag} \ g_x + r_{as} \cdot \ s_{ax}$$

where g_x is the 'g' of the individual 'x', s_{ax} is the 's' of the indivdual 'x' in the test 'a' and r_{ag}, r_{as} are constants, independent of 'x'.

As regards the nature of 'g', Spearman calls it mental energy or force possessed by an individual In physiological terms, as preferred by the behaviourists, it represents the 'plasticity of an individual's nervous system.'

The above analysis given by Spearman about the nature of intelligence has been much elaborated and supplemented by later workers, particularly L. L. Thurstone, Godfrey Thomson, and Cyril Burt. Their work has been mostly mathematical and highly technical but their repercussions on educational and psychological theory are important and must be understood.

[1] For the mathematical proof of this divisibility, see Appendix I SPEARMAN'S *The Abilities of Man*

Since the first enunciation of Spearman's mathematical theory of intelligence, doubts have been expressed both about the validity of the psychological inferences he derives thereof and also about the generality of the mathematical methods of analysis employed by him. On the former point Godfrey Thomson has been Spearman's persistent critic who has been able to carry his viewpoint through Godfrey Thomson has shown that the postulation of a "g" factor is not mathematically essential to explain the hierarchy of correlations observed in a correlation matrix and the vanishing of the tetrad differences resulting therefrom These, he has shown, may be explained without the supposition of a single "g" factor The postulation of a single "g" factor is a simple hypothesis, but this must not be confused with any analytical uniqueness for "g". This cuts at the very root of Spearman's position, and although Spearman's postulation of "g" is an accepted hypothesis and perhaps will remain so till a simpler alternative system can be proposed, it undoubtedly indicates that cognitive ability may perhaps not be explained in as simple term as those proposed by Spearman Of course, Thomson's own alternative of the "sampling" theory is not a simpler and a more workable hypothesis, and hence on the constructive side, Thomson's viewpoint is not a generally accepted one.

On the latter point, namely about the generality of the mathematical methods of analysis, Thurstone[1] has been able to put in much useful constructive suggestions

[1] THURSTONE· *Vectors of Mind* (Chicago, 1935).

Spearman's method of the mathematical analysis of the correlation matrix was based on the supposition that the matrix would show perfect hierarchical order provided sufficient practical precautions were taken in the selection of tests and their administration Later experimental work has not borne out this supposition, so that the correlation matrix is not necessarily of rank one. Mathematical methods have been devised which would make analysis under these conditions possible. This has been achieved by L. L. Thurstone by "a generalization of Spearman's idea of zero tetrad-differences".[1] Thurstone's method of analysis, commonly known as Multiple Factor analysis, is therefore in reality a more general treatment of the correlation data, when the rank of the matrix may be 'n'.

Thurstone's analysis discovers not a single general factor, "g", but a number of factors such as "g", "v", "f", "n" etc. In his monumental experimental research[2] with 57 tests, he discovered some 7 important factors in the cognitive ability of a human individual. Most of these, such as "v", "f", "n" etc., have been confirmed by later researches. On the theoretical side, thus, Thurstone's method of analysis "has made it clear that the theory of Two Factors in its original form had been superseded by a theory of many factors".[3]

The different cognitive factors discovered by Thurstone and other workers have been psychologically identified For example, "v" is the factor concerned with

[1] G H THOMSON. *The Factorial analysis of Human ability*, page 20
[2] L L THURSTONE: *Primary Mental abilities*
[3] G H. THOMSON· *The Factorial analysis of Human ability*, page 20

an individual's verbal facility—the capacity to deal with words and language, both oral and written "F" is the ability to deal with concrete objects in a practical manner such as that would be needed, for example, by an engineer or an architect. "n" is the ability to deal with arithmetical numbers such as would be needed by an accountant.

Certain other cognitive factors, besides the above, have been discovered, but both their number as well as their nature[1] are still a matter of experimental investigation and theoretical discussion But what now seems well established is that a single "g" factor, with certain specifics is not a complete explanation Thurstone's multiple factor analysis does not deny the existence of "g", in fact, "g" comes out as the first and, perhaps the most important single factor, in multiple factor analysis, but other factors, particularly "v" and "F" must be taken into account to explain the nature of intelligence.[2]

The exact relation of the different cognitive factors with one another and particularly with "g" has also been a point of thorough enquiry in recent times It has been shown that the different factors, "v", "F", "n", are orthogonal, *i e.*, independent of one another, so that an individual's possessing one does not warrant us in supposing that he possesses another also This is borne out by our everyday observations too. The individual who has a facile expression is not necessarily the one who is also good with his hand Or again, the ability

[1] BURT *The Factors of the Mind* (London), 1940.

[2] W. P. ALEXANDER *Intelligence, Concrete and Abstract* (1935) being the *British Journal of Psychology, Monograph Supplement*, Vol. VI, No. 19.

to handle numbers well is no guarantee of a command over language or over the handling of the concrete material. Thus an individual may possess varying amounts of these different abilities.

In his important thesis, "Intelligence, Concrete and Abstract", Alexander has recently contended with the help of objective data, that the "g" factor too works, not in a vacuum, but through the medium of either the "v" ability or the "F" ability. Thus according to him, we must recognize two functional intelligences, the "abstract intelligence" and the "concrete intelligence"—the "g v" and the "g F" in factor nomenclature. Educationally, this theory is of much impomtance, for it demands of us provision not only for the bookish type of the boy but also compels recognition of the boy who is essentially "practical"[1]—a proposition which many educationists would also put forward but on other grounds.

In view of the different cognitive abilities of an individual such as, "g", "v", "F", ... etc., the question has arisen as to what should be understood by the term "intelligence". Burt and Enid John have proposed the use of the terms "basic intelligence" and "total intelligence". The ability "g", they would prefer to call as "basic intelligence", while they would call the sum or average of man's cognitive abilities as "total intelligence". "For theoretical purposes, the more usual view is probably the more acceptable, namely that which treats intelligence as something fundamental,

[1] W. P. ALEXANDER: *The Educational Needs of Democracy.*

with the verbal, numerical and other abilities superimposed, but for practical purposes it is perhaps more helpful to treat Intelligence Tests as measuring, not 'basic intelligence' (as we may call it), but 'total intelligence' ".[1]

INTELLIGENCE TESTS

Binet-Simon Scale.—To Alfred Binet, a French psychologist, must be given the credit of first designing systematic type of mental tests, and of devising a scale for measuring the intelligence of children His early attempts, at the close of the last century, were in some of the directions already mentioned, *viz*, applying simple motor and sensory tests A little later, in the beginning of the present century, he was faced with the definite problem of assisting the administrative educational authorities in examining the children in the schools of Paris, with a view to sort the mentally deficient children, so that they may be transferred to special schools The early attempts were of a hit-and-miss nature. He believed in the theory that, "nearly all phenomena with which psychology concerns itself are phenomena of intelligence," and hence to measure it satisfactorily there must be several tests directed into different channels He got the clue from the ordinary teacher's method. He found that the proper method of testing a child was through a certain number of questions of the conversational type. His next achievement

[1] BURT AND ENID JOHN *A Factorial analysis of Terman-Binet Tests, British Journal of Educational Psychology*, Nov. 1942

was to conceive a scale of measurement. The conception was gradually refined till it assumed the form we know now. He decided to measure intelligence in terms of mental age. He gathered together a number of miscellaneous test questions suited to each particular age. These questions were properly graded after considerable experimentation. Each correct answer counted as a fraction of a mental year. If there were six problems for a year, the correct solution of one gave two months as mental age.

Theodore Simon, another French psychologist, collaborated with Binet, and hence the scale has been called the Binet-Simon Scale After several trials, in 1911 Binet brought out the final version[1] of his scale. This consisted of a set of 54 tests. He started with children of three years, and went up to the adult stage Theoretically, he had five tests for each age, but an inspection of the original assignment shows that he had only four tests for the age of four, and that he omitted the ages XI, XIII, and XIV. He had questions of the following type for the age III:—

Test (1) Sex—Are you a little boy or a little girl? Test (2) Name—What is your name? Test (3) Pointing—Show me your nose, ears, eyes, etc. Test (4) Repeating numbers up to two—'I am going to say some numbers. Listen and then say after me· 2, 5; 3, 7; 6, 8; etc.' Test (5) Picture—Enunciation of important objects seen in a given picture.

[1] The first scale came out in 1905, the second in 1908, and the final in 1911.

The calculation of mental age was quite simple. A boy's chronological age was recorded. Suppose it was seven, then in order to have a mental age of seven he was supposed to solve all tests up to and including those for the seventh year When a child whose mental ability was unknown had to be tested, he was first tried with the tests corresponding to his chronological age. Then he was examined upwards or downwards according as he fared in his examination For a child passing stray tests Binet suggested adding 1/5 of a year for each test passed

In Binet's tests there was a variety of problems so that intelligence expressed in any direction could be measured. In order that the tests might be reliable, he standardized them by administering them on a large number of children, and scored out those that were unsuitable In his allocation of tests for different ages, while he had a method it was not always consistent If 90% of children of a certain age did the test he regarded it as being too easy A success by 65% was considered to be adequate for the inclusion of a test.[1]

Binet's scale has been criticized both on psychological as well as on practical basis He had arranged his tests in age groups, and thus assumed that intellectual growth proceeded in similar and regular stages during its whole course of development. A child is allotted a certain degree of mental age for passing a test If he fails answer, he gets a zero.

[1] Burt's plan at present is to regard a test as standard if 50% of children who are normally of the year below the age pass it. A test meant for 10 year old passed by 50% of 9 year old ones, and so on

Now, in this conversational type of test it is easy to see that there are different grades of a child's performance between zero and the maximum allotment, and no credit is given for partial success. Again, in Binet's scale the tests have been allotted to various ages in rather an irregular plan.

Since 1911, Binet's scale has been put to experiment in various countries and modified in the light of the experiences gathered Although there are several revisions of the scale, we shall mention only two important ones—(1) The Stanford revision due to Terman, and (2) The London revision due to Burt.

The Sanford Revision—This is due to Terman and his collaborators who worked the tests in California The standard scale contains ninety tests Instead of the five tests for a year in the original scale, they have been made six. so that each test gives a score of two months of mental age. For the age twelve there are eight tests, for the average adult after the age of fourteen there are six, and for the superior adult there are another six

New tests[1] have been added by Terman, and several alterations made in the allocation of the tests to various age groups. Some of the new tests are indeed ingenious. The additions have been made mostly in the higher stages. Some of the typical additions may be mentioned. For age VII, there is, 'tying a shoe string round the examiner's finger in a

[1] See TERMAN· *The Measurement of Intelligence*, pages 56-61

bow-knot', also repeating digits from memory in reverse order [1] For age VIII, there is, 'making with a pencil on a simple map the path to be followed in searching for lost ball in a circular field entered from a gate', also three things are to be compared, e g, snake, cow, sparrow For the superior adult the ingenuity tests are rather interesting, e g, 'A mother sent her boy to the river and told him to bring exactly seven pints of water. She gave him a three-pint vessel and a five-pint vessel. Show how the boy could measure the water using nothing but the two vessels.'

A further revision of the 1916 Stanford-Binet tests was carried out by Terman and Merrill and published as the "New Revised Stanford-Binet Tests of Intelligence" with the accompanying handbook "Measuring Intelligence" (Harrap) in 1937 This new revision stands out as a masterpiece of comprehensive experimental research carried for more than 20 years The standardisation has been carried out with a thoroughness that makes the Revised Test unique in its reliability and validity and hence the most widely applied Test of Intelligence at the present time not only in America but even in Britain and other English speaking countries. Two equivalent and alternative forms of Tests—known as Fom L and Fom M—have been provided with numerous additions and alterations in the test items, with the procedures for administration and scoring defined meticulously, so as to make it a fit tool of research with a

[1] This was originally suggested by BOBERTAG in Germany

wide variety of subjects, including defectives, delinquents, the retarted, the gifted, the normal and the psychopathic.

Instead of employing mental age, Terman preferred expressing the results of intelligence measurement in terms of the Intelligence Quotient, which is the ratio of the mental to the chronological age.

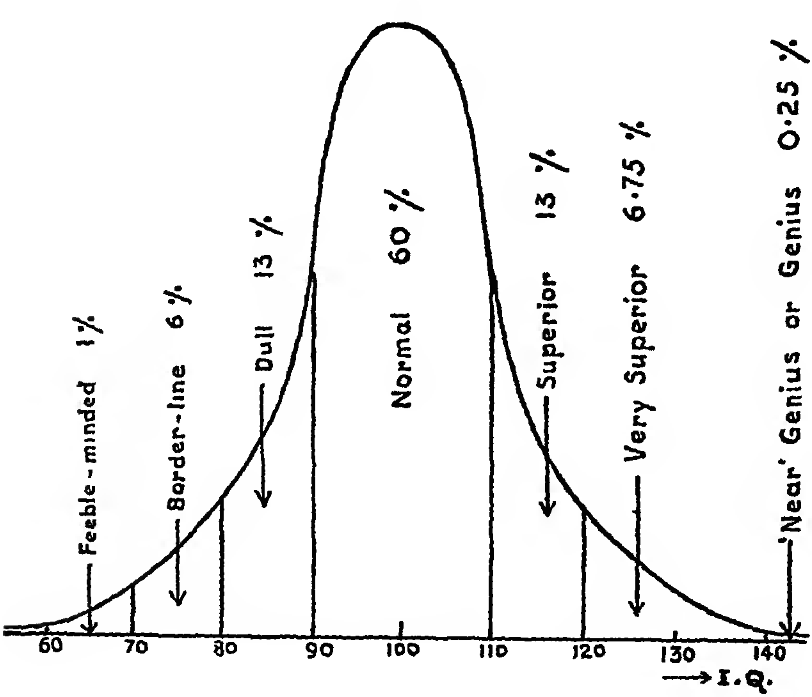
$$I.Q = \frac{M.\ A.}{Cr.\ A.}$$

This ratio is multiplied by 100 for convenience Measurements expressed in terms of I Q. have been widely accepted. Terman has classified human intelligence in terms of the various values of I.Q.

Below 20-25	Idiots
Up to 50	Imbeciles
50-70	Morons
Below 70	Feeble-minded
70-80	Mental deficiency (mostly borderline)
80-90	Dull
90-110	Average intelligence
110-120	Superior ,,
120-140	Very superior ,,
Above 140	Genius
200	Supreme genius

London Revision.—About the time that Binet brought out his second scale in 1908, Burt was busy with his investigations on mental testing at Oxford. He later continued the same work in Liverpool. He

gave twelve psychological tests to different age groups of children at school, and found out the correlation between the performance in the tests and the opinions of the teachers as regards the intelligence of the children After the Binet scale was issued, Burt started



work on Binet's lines He received help and guidance from Simon who had collaborated with Binet. The Binet tests were translated, and tried on a large scale on children in London schools Burt felt the need of revising, modifying, and rearranging various tests.

He found that Binets scale suited the junior grades better than the senior ones Burt always believed in the development of the power of reasoning along with the growth of the intelligence. Consequently, his tests for the higher grades involve reasoning rather prominently.

The London Revision contains 65 tests[1] for age groups from III to XVI The number of tests for each age group is not the same. Some typical tests from Burt may be mentioned For age VIII.—Answering easy questions, (*a*) 'suppose you have to go somewhere: what must you do if you miss the train? (*b*) what ought you to do, if you broke something belonging to somebody else?' For age XI—'Why should we judge a person by what he does and not by what he says?' For age XV—(A) Giving differences between abstract terms. 'what is the difference between (1) pleasure and happiness, (2) poverty and misery' (B) Drawing from imagination the cuts in a folded paper.

Group Tests—As is obvious, Binet's tests as well as other revisions of the same, are individual tests with the help of which only one child can be tested at a time Such a procedure involves a great expense of time when large numbers have to be tested. In the beginning, only those suspected of mental deficiency were to be tested, and so the method of individual testing worked satisfactorily. Later, when the mental tests had to be employed on a large scale, group tests had to be

[1] See BURT *Mental and Scholastic Tests*, pages 19-24

devised These were first devised in order to solve the problem of testing the American army as a whole, during the war time, in order to select individuals who could be put in charge of units Since then group tests have become more prevalent than the others But these, in no way, have been able to displace the individual tests which are always necessary when a definite judgment about any individual case has to be arrived at

The group tests are written tests administered to large numbers simultaneously They consist partly of some of the tasks referring to higher mental processes included in the individual tests, and partly of tests specially designed for the purpose The whole lot of tests set in any examination consist of five or six separate tests, each belonging to a different type of mental activity. Each test consists of twenty to twenty-five short questions of a certain type Burt holds that, "for an efficient examination, it is far better to use a large number of short questions than a small number of long questions" The tests are put together in the form of a booklet Each candidate is given a copy, and asked to put down the answers in specified places Each test may be separately timed, or the whole set of tests may be so done, according to what the investigator has standardised.

Some of the typical tests are given below —

I Opposites—(for mentioning opposite words in blank spaces)

(a) Cheap. ... (b) Easy. ....
(c) Long. ... (d) Shut

II. Analogies—(for choice of the correct word by underlining).

(a) Good is to bad as white is to clean, black, wicked, red.

(b) Sitting is to chair as sleeping is to walking, tired, bed, dream.

III. Completion—(for choice of the suitable word by crossing)

green green
(a) Grass is wet but the sky is wet
blue blue

fell cured
(b) The man rode off his bicycle and broke his arm
climbed changed

IV. Arithmetic—

(a) Insert the next two numbers in the series:—

11	10	9	8	7	6—	—
1	2	4	8	16	32—	—

(b) Cross out the extra number in each line:—

26	3	7	31	13	17
8	2	16	32	6	4

There are a large number of group tests devised for school children, adults, etc., which have been standardised The following may be particularly mentioned:—(1) Terman's group tests; (2) Otis's group tests; (3) Northumberland tests by Godfrey H Thomson.

Performance Tests.—The individual as well as the group tests all consist of questions to be answered verbally or in writing. In them all some linguistic ability on the part of the examine is demanded

Now, this is a serious drawback when we have to test people who are not sufficiently literate, or who are physically defective *e.g*, deaf and dumb. Even for normal children insufficient linguistic control, or nervousness due to oral examination, etc, are handicaps. To meet this difficulty performance tests have been devised. For the deaf and the dumb they may be regarded as the sole tests; for others they are supplementary tests helping the tester to know the child more exactly. In performance tests the subject is asked to fit together pieces of cardboard so as to make certain shapes; to put together small blocks, cylinders, cubes, etc, in order to construct some structure. In certain cases the subject is asked to imitate a movement, or cut out something, or manipulate certain objects in a particular way, or to solve a jig-saw puzzle

The Seguin form-board test is very well kown It consists of ten wooden blocks (square, triangle, circle, star, etc) and each has to be fitted on a given board in a given amount of time. Collins and Drever have drawn up a series of non-linguistic tests for the deaf and the normal children These tests have been widely employed in Edinburgh and certain counties of England. They have been standardized, and suitable norms arrived at after prolonged experimentation.

The performance tests of Intelligence have been gaining much in popularity in recent years. With the wider adoption of the Intelligence Test technique, it is becoming more urgent to investigate the mental abilities of the illiterate and the backward classes of people

throughout the world. Performance Tests are thus being standardised with great rapidity and thoroughness. W. P Alexander[1] has standardised a battery of Performance Tests which promises to have a great future.

Alexander's battery consists of three tests:—(1) The Kohs' Block Design Test (2) The Passalong Test and (3) the Cube Construction Test.

In the Kohs' Block Design Test, there are sixteen pieces of one-inch cubes which have been painted on its six sides with four different colours in a prescribed manner. The subject is asked to prepare certain coloured designs, of progressive difficulty, with the help of the coloured cubes Kohs' the original inventor of the test claims to discover the analytico-synthetic ability of an individual with its application

The Passalong Test, invented by Alexander himself, consists in presenting progressively difficult problematic situations to the subject in terms of certain simple concrete material. This tests the problem solving capacity of the subject when the problem is in a concrete form

The Cube-construction Test, originally suggested by Collins and Drever, is a test in the constructive ability of an individual in terms of certain simple materials, such as cubes, rectangular slabs etc.

Alexander has provided norms for the Battery both in terms of the time taken by the subject and the success attained by him. Dr. Macmeekan in her survey of "The Intelligence of a representative group of Scottish

[1] W P. ALEXANDER: *Intelligence, Concrete and Abstract*, Appendix II. p. 150

Children"[1] employed some of the above and other Performance Tests. An analysis of the Test-scores was carried out by Godfrey Thomson[2] with many interesting conclusions

Growth of Intelligence

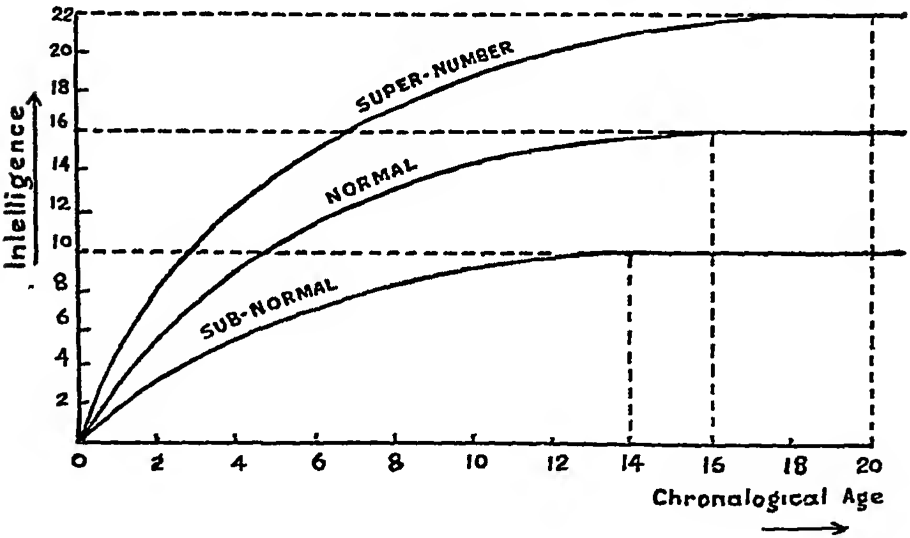
As a result of investigation with intelligence tests it has been found that in an individual intelligence goes on growing from childhood to maturity. The native mental abilities of a person are not expressed right after birth, but develop during his period of growth For every individual both the limit and the rate of growth are fixed Psychologists have not yet been able to find out definitely the rate of this growth, nor the age at which the normal child reaches his maximum. It has, however, been found that during the years of growth the 'intelligence quotient' remains constant within reasonable limits.

The estimated age of maximum growth for normal children differs with different testers Binet fixes it at fifteen. Terman at sixteen; Ballard also regards it as sixteen, but Otis takes it up to eighteen. Generally speaking, it should be taken at sixteen years for normal children. It has been found that the intelligence of super-normal children grows more rapidly, and keeps on growing till a higher age, than that of the normal

[1] MALMEEKAN· *The Intelligence of a representative group of Scottish Children*, (London, 1939)

[2] THOMSON· *An Analysis of Performance Test Scores*, (London, 1940).

ones. Similarly, that of the normals grows faster, and for a longer time, than that of the sub-normals, or, the deficients. The sub-normals reach their maximum at fourteen, the normals at sixteen, and the super-normals at twenty After the maximum has been reached, the adult does not grow so far as his intelligence is concerned. He gets more experienced, begins



to take a wider view of questions, and gets more specialized so far as his aptitudes and business activities are concerned. He gathers more knowledge, but this does not mean that his innate mental ability increases. The intelligence tests given to adults clearly bear this out.

Uses of Intelligence Tests

Intelligence tests, whether individual, or group, or performance, aim at discovering the inborn mental

ability of a child, and thus determine his educable capacity. For this purpose the ordinary oral and written examinations suffer from certain defects. They are so often subjective The examiner has more than his due share in the assessment. Then again, they lay undue emphasis on knowledge rather than on powers. Now, intelligence tests have been made as objective as possible In administering them the personality of the examiner makes very little difference Then, the tests involve knowledge and experience only of a very general nature, and thus give a better idea of powers. They attempt to test native ability rather than acquired knowledge But it is interesting to see that despite these advantages the tests represent the usual types of examinations—oral, written, and practical They only eliminate the difficulties which beset the examinations as true tests of an individual's possibilities of education It should, however, be clear that intelligence tests in no way actually can, or even claim to, replace examinations given with a view to testing the specific achievement in any subject or branch of study But their claim to predict the possibilities of a child regarding his educable capacity, particularly in the early stages before he has been taught to any large extent, cannot be denied.

Intelligence tests are very useful for classifying children, and for distributing them in various grades. With their help it is possible to separate the 'mental deficients,' and transfer them to special schools where curricula better adapted to their needs can be used. The question of mental deficiency will have to be

taken up seriously in India as compulsory primary education expands. So far as admissions to classes of schools in India are concerned, a child is admitted either on the basis of his chronological age, or as is mostly done, on the basis of what he achieves in test examinations administered by the admitting authorities. No test is made to find out whether a child possesses sufficient educable capacity to cope with a certain syllabus in a given amount of time. It must be found out whether his mental age warrants of an entry in a certain standard.

With children of the same average I, Q, put together in a class, there is every possibility of instruction being uniformly useful. So often the teaching goes over the heads of some, is useful to others, and falls short for the rest. There is thus wastage of energy on the part of the teacher as well as the taught. But if intelligence tests are employed to solve some of these difficulties, then a greater flexibility of grades than that existing at present will have to be permitted and re-grading done oftener in order to obtain perfectly homogeneous groups. The device employed at present in England is to have three "streams", "A", "B" and "C" running throughout the whole school.[1] On the basis of intelligence tests, pupils are classified either as "bright," "average" or "dull" and put into either of the "A" "B" or "C" divisions respectively of a class. The boy

[1] BOARD OF EDUCATION: *Handbook of suggestions for Teachers* (1937), p. 33.

continues in his own division or "stream" throughout his school career and the methods and curricula are fixed to suit the particular stream or mental capacity.

As a result of intelligence testing the problem of the duller boy is being fairly efficiently solved. The mental deficient is transferred to a special school The backward boy is given particular attention in the class, but the brighter child, particularly because he is so, is left to take care of himself. It has been found in the course of various investigations in connection with intelligence tests, that the brighter children, speaking proportionately, are more frequently retarded than the normal ones. Despite possessing a higher I. Q they work through the syllabus designed for the average, with the result that the expression of their mental powers never reaches the legitimate standard

A commonly adopted way of dealing with the brighter child is to hasten his promotion and put him in a higher standard. But if this is done he is placed chronologically in an unsuitable surrounding. The chronological as well as the mental age of the child should be taken into account in grading him. We have thus not to accept unquestionably the theory of pushing up indefinitely the bright child, but to advocate the method of special attention. He should be given more work, better books and a slightly more advanced syllabus to work upon, thus avoiding habits of slothfulness from becoming ingrained in him.

Intelligence Tests are now gaining universal recognition as a means of assessing the intelligence of a whole

nation or a country. In 1932[1], was carried out a monumental survey in Scotland, the first of its kind, wherein the whole age group of children of the age 11 plus in the country, was tested and data for the intelligence of the children of the whole Scottish nation was obtained. Thus intelligence testing is now a recognized and regular feature of national educational administration in progressive countries and has proved how dependable it is, in hands trained to use it skilfully.

Intelligence tests can be used as a reliable method of examination for the award of scholarships at certain standards. They can also be employed for purposes of determining admissions, and making selections for various walks of life. The development of the theory and practice of intelligence and other mental testing has had a far-reaching effect on vocational guidance and selection. A good deal of work was done by Prof. Stern at his Psychological clinic at Hamburg. The National Institute of Industrial Psychology London[2] whose director till lately was Prof. Charles Myers, has been able to put vocational guidance on a truly scientific basis. The cognitive side of an individual—boy or girl—is tested not only with the help of standardised intelligence tests which indicate the g-ability of the subject, but specialized abilities, such as the verbal and the mechanical etc., are discovered with the aid of specially devised tests. The affective-conative side of the indi-

[1] *The Scottish Council for Research in Education*: The Intelligence of Scottish Children (University of London Press, 1932).

[2] SEE ITS JOURNAL: *Occupational Psychology—Aldwych House*, London, W. C. 2.

vidual is estimated with the help of interviews, previous school and home records and certain psychological tests. Thus a fairly complete and accurate picture of the whole personality of the boy or girl is obtained, and knowing the requirements of a particular trade, industry or service, it has been found possible to advice the individual as to the vocation most fitted[1]. Subsequent follow-ups have established that the advice given by a well-trained vocational psychologist is vastly more effective than a haphazard vocational choice. Great impetus to vocational selection was given by the last war (1939-45) as most of the military commands in Britain, America and other countries decided to base their selection of military personnel on the basis of psychological tests[2].

Intelligence Tests and Environment

Intelligence tests aim at measuring the innate ability of an individual. Consequently in framing them care is taken to eliminate as much of educational influence as possible. The knowledge or experience involved in answering them is of a general nature; still it is difficult to imagine intelligence being measured in a vacuous surrounding, where there is absolutely no influence of educational attainments. The problem, therefore, for consideration is: how far

[1] Oakley and Macrae: *Handbook of Vocational Guidance* (London, 1937).

[2] See. *Occupational Psychology*, July 1945, articles by E. A. Bott and Alec Rodger

is intelligence, as measured through the various tests, an indication of pure innate ability, and how far is it determined by educational attainments?

There is another cognate question, too. The intelligence tests give an idea of one's educable capacity. The problem then to consider is: how far is one's educational attainment dependent upon the capacity that one possesses, and how far is it effected by any other factor? We shall discuss both these important matters—(1) the extent to which educational attainment influences the performances in the intelligence tests, and (2) the rolé that intelligence plays in determining one's educational attainments.

Burt investigated the question of the influence of educational attainments on a child's performance in the Binet-Simon Tests (London Revision). He discovered a series of correlations between age, intelligence (in terms of the teacher's opinion), school attainments, Binet-Simon Test scores, etc Partial correlations were calculated From these correlations he obtained a regression equation which he expressed as—

$$B = \cdot 54\, S + \cdot 33\, I + \cdot 11\, A,$$

where 'B' stands for mental age as determined by the Binet-Simon Tests, 'S' represents school attainments as expressed in terms of educational age, 'I' is the intellectual development reached at a certain age, and 'A' the chronological age.

From the above equation it is clear that one-ninth of the Binet-Simon score is dependent on the chronological age, one-third on intelligence, and a

little more than half on school attainments. Binet-Simon Tests are indicative of true intelligence more at lower ages than at the upper ones, because of the increasing amount of scholastic information which enters in the tests. A child merely by growing in years, devoid of the general experience which civilized life and school training give, would not do well in the Binet-Simon Tests. In general, to put the conclusion in the illuminating phraseology of Burt, "So barren is growth deprived of opportunity"[1]

Hugh Gordon's experiments, referred to by Godfrey H. Thomson, also indicate that schooling has a considerable influence on the I Q. as determined by the Binet-Simon Tests. Gordon conducted his research amongst the gypsies and canal-boatmen's children These have practically no schooling Further, they have little significant social intercourse which would widen their horizon. Gordon found that the I. Q. sank very significantly as age advanced, showing thereby the great handicap in which children without schooling find themselves when tested in the older years.

Binet's Tests seem to be unduly determined by schooling, but in the results of any other tests the influence of schooling or that of education in general would enter, as heredity finds expression only through a certain medium Thomson's analogy of the seed and gardener is significant. "In gardening there is, no doubt, inherent in each seed a maximum limit of size

[1] BURT *Mental and Scholastic Tests* page 183,

and quality. But no gardener, nobody, but knows that more than good seed is necessary. It is not immaterial whether it be sown upon a rock, or by the wayside or in good ground; nor must it lack moisture."[1]

It would be interesting to note in what direction the investigations with other tests would point if a regression equation were calculated. It is possible that with tests,[2] psychologically better devised, the influence of school attainment in bringing about the result may be less. But one thing is certain intelligence develops not merely by the advance of chronological age, but by the extent of expression that it finds in a suitable environment.

To turn to the other question,—how far is school attainment dependent upon native intelligence? Researches on this question point in the desired direction, that one's intelligence is a great determining factor in one's achievements. The higher the I. Q. as found by the tests, the better is one likely to do

Heilman, in the course of his famous paper in the twenty-seventh Year Book of the American National Society for the Study of Education, has arrived at a regression equation, on the basis of certain partial correlations, which he expresses as:—

[1] G. H THOMSON: *Instinct, Intelligence and Character*, page 218.

[2] BURT. claims that his reasoning tests are as much independent of schooling as possible. For some of these tests See BALLARD'S Mental Tests, page 93

E A.$=$·6711 M.A.$+$·2155 S.A.$+$·0751 S E S., where 'EA.' is the educational attainment as measured by the Stanford achievement tests, 'M.A.' is the mental age obtained by the Stanford revision of Binet tests, 'S.A.' is the total school attendance in days, and 'S.E.S.' is a measure of the socio-economic status of the home. It is obvious from the equation that the best prediction that can be made as regards the educational attainments of a child is on the basis of his I.Q. This also justifies the fact that properly devised intelligence tests are true determiners of the educable capacity of the child.

Intelligence Testing in India

The educational problems which have been helped by mental testing in the West, are present here in this country as well, and so the utility of intelligence tests cannot be questioned. There is need for a scientific method of classifying and grading children in schools according to their mental ability. The problem of mental deficients and retarted children is quite as important as anywhere else, and will become positively acute with the expansion of compulsory primary education. The need for supplementing examinations with other reliable testing aids also is being keenly felt.

Sporadic attempts[1] have been made in various parts of the country to test children at various stages

[1] (1) A Hindustani Binet-performance scale issued from the psychology department, Christian College, Lahore:—It is a creditable experiment

with the help of tests adapted for the purpose. In some places the Binet-Simon tests have been translated into the local Vernaculars, and administered over certain areas Some modifications of group tests have also been tried Almost all the experiments need to be followed up. The field is wide. But while the opportunities for research are considerable, the difficulties in the way of mental testing are not insignificant.

As a whole, India is a country with an entirely different social and religious background compared

but rather hasty so far as its conclusions are concerned The standardization of the scale is based only on an examination of 929 cases, which is after all, not a satisfactory number, considering the vast number of Urdu and Punjabi speaking children in a province of the size of the Punjab, teeming with caste and sub-caste groups. Although the number of schools where the experiment was tried was 37, the average sample per school is very small except in the case of about two dozen schools No further work of any importance with the scale obtained, has been done The experiment deserves to be followed up.

(2) The Hindi simplex group tests just being tried out from Benares —The experimenters propose to try the tests on significantly large numbers, and the revised norms and scale may probably be more reliable But the area over which the experiment is being launched is too wide (East United Provinces to Rajputana and Central Provinces) The environmental conditions are not uniform throughout; and not all the tests appear to be equally suitable

(3) Several little investigations have been attempted in the South, particularly guided by the University of Madras Bulletin No. 15 of the Teachers College, Saidapet, gives an account of the investigations carried on there. Woodburne's views on the problems of intelligence testing in India deserve serious consideration, particularly so far as they relate to South India.

(4) The Etawah investigation with Vernacular school children, when completed, may throw some light on the question of testing Hindi speak-

with any of the countries in the West, and hence the tests given in the West, if applied here, need more drastic revision than they did in being transferred from one country to another there. The Binet tests is being transferred from France to England needed modification, but the extent of that modification was much less than would be needed in tansferring them here

India is a vast country with so many Vernaculars, each having a social, sometimes even a religious basis,[1]—factors which influence markedly the life and outlook of those speaking it Even in the same province where Urdu and Hindi are both spoken, a literal translation of tests from Urdu to Hindi or *vice versa* will not do, as the contexts of the Urdu and Hindi speaking minds are so different.

The type of test which we need to use is a matter which has been discussed by some of those who have experimented in this field There are obviously three

ing rural children in U P The Tests employed in this investigation appear to put undue weightage on geographical and arithmetical ability.

(5) The Govt' Training College Allahabad survey in Intelligence, Arithmatic and English of all pupils of age 11+in every Govt, High School of the U P conducted by Dr Sohan Lall in 1942 was a systematic and scientific attempt. The test material and the results when published should prove useful.

(6) Kamat's revision of the Stanford-Binet tests for Kannarese and Marathi speaking children is again a thorough investigation with a useful handbook, Measuring Intelligence of Indian Children (Oxford, 1940).

(7) Bhatia's (Govt Training College, Allahabad) Battery of Performance Tests and his attempt at the investigation of the intelligence of the illiterates of U P, should also prove interesting when completed.

alternatives possible: (1) to translate exactly the tests used in the West; (2) to modify them and adapt them to the conditions here; and (3) to devise altogether new tests.

In criticizing the Binet tests we pointed out that they have a linguistic bias. This difficulty is serious here, as the proportion of illiterate children, at any rate of those not sufficiently well up in linguistic ability to be able to respond to these tests, is considerable. For those with whom they can be used, there are other difficulties. The translation into each language brings about its own difficulties, and literal translations into different Vernaculars will uot make the test of uniform difficulty. We can have an Indian revision in general, and then revised forms of the same for different linguistic or geographical areas as necessary.

The question of environmental differences is rather important Language is one problem. Then there are differences of castes, owing to which the environments from which the chidren draw general knowledge and general experiences become so varied. These social differences are aggravated again, because of the differences in the economic status of the various castes. The tests given in the West involve ability both in quick mental manipulation, as well as in motor adjustment. The Indian child, particuarly the high caste one, owing to the influence of ages is extremely sharp so far as mental manipulation is concerned, but regarding the other, he is at a great disadvantage compared with the western child. A judgment of capability may thus vary considerably.

Some of the tests, owing either to translation, or to their inherent unsuitability, cannot be employed here. The simple inquiry as regards the 'surname' would baffle the Indian child in general,—the surname in the strict sense, being a fashion only with the Anglo-Vernacular educated people in the country. Again a test like naming words which rhyme with certain words, *e.g.*, hill, mill, etc., gets completely altered, so far as the extent of difficulty is concerned, when rendered in different languages Performance tests if properly modified seem to be the least disadvantageous in their application Sufficient clues, however, have been offered by researches in the West, and it is not an impossible proposition to arrive at either a well-modified form of Western tests, or to devise more or less new tests to suit the Indian environment. The business may be difficult, but is not impossible for a gifted enthusiast

Besides the devising or adapting of tests, there are some other difficulties also. The determination of the exact chronological age, which is necessary for purposes of standardization, is an acute problem, particularly in rural areas The correctness of the chronological ages of school children in a significant number of cases, is doubtful. Again, the lack of sufficiently trained men, efficient in the technique and statistics of mental testing sometimes proves an impediment in launching experiments on a wide scale. A fair proportion of those actually engaged in the work of teaching and educating are not fully conscious of the necessity of

applying this device Professional opinion needs to be educated.

ACHIEVEMENT TESTS

In order to improve, or even replace where possible, the so-called examinations which aim at determining the progress of children in the different branches of study, achievement tests have been devised. They aim at measuring in an objective and accurate way what the child gains through schooling. They are not intended to measure the innate ability but the result of education.

Achievement tests have been devised mostly so far as the main subjects of the primary school are concerned The subjects mainly tackled are Reading, Writing, Arithmetic, Drawing, Composition, Dictation, etc [1] Tests have been devised to determine the achievement in as many sub-branches of these subjects as possible. They have brought about considerable reformation in the examination system of the lower stages of the school. As regards the higher stages, the specialist teacher of a subject knows what best to determine, and how to make his judgment exact and accurate.

There are some important factors involved in the work of devising these tests. One has to take into account the syllabuses which are being followed, the standards of work done, and the order in which the subjects of study and their branches are taken up. Hence, each educational system has to devise

[1] See Burt: *Mental and Scholastic Tests*—Memorandum III gives the tests.

and standardize its own tests. In some subjects it is easy to measure the achievement, in others it is difficult to obtain a scale for measurement. In Arithmetic, the achievement is measured in terms of the performance of the child,—the number of sums correctly solved; but in subjects like handwriting, composition, etc., some sort of scale, i é., standards for comparison have to be obtained The element of objective judgment in such subjects decreases Still it is interesting to note that many specimens have been collected and a selection made after thorough examination, in order to arrive at a comparative scale

Burt has classified the various school subjects in certain groups, which while not meant for water-tight division, indicate marked differentiation for purposes of devising tests and scales —

(1) Arithmetical group—oral, written

(2) Manual group—Drawing, Handwriting, Handwork

(3) Linguistic group—Dictation, Reading (Speed)

(4) Composition group—History, Geography, Science, Composition.

Observed correlation indicate high positive relationship between the various members of a group. Groups (3) and (4) are positively correlated to one another. Groups (1) and (2), (1) and (3), and (2) and (3) show either negative or very low correlation.

Just as a child's I. Q can be arrived at with the help of intelligence tests, in the same way his 'educational quotient' can be obtained with the help of achievement tests.

$$\text{Educational Quotient} = \frac{\text{Educational age} \times 100}{\text{Chronological age}}; \text{ and}$$

$$\text{Educational age} = \frac{\text{Total of achievements ages in various subjects}}{\text{Number of subjects}}$$

Achievement tests do not question the intuitive judgment of the teacher who has an intimate knowledge of the individuals in his class through his constant and long contact with them. They are meant more or less to supplement the traditional written examinations. They are also diagnostic, and help a teacher in finding out in which direction the difficulty of the pupil lies, and what it is that retards his progress in a particular subject. For instance, in Arithmetic the teacher needs to know whether the child is weak as regards speed, or accuracy. If it is accuracy it is worthwhile finding out further, what particuar phase of the process, multipication, or carrying figures, or handling fractions, or grasp of the very fundamentals, is at fault. Again, it is possible for the teacher to find out which mental function is weak in its operation,—visual memory, mechanical memory, industry, personal dislike for the subject, logical reasoning, etc. Armed with this exact knowledge of details the teacher is helped considerably more than he would be by a random judgment.

Character and Temperament Tests

We have time and again distinguished between the intellectual and emotional aspects of the mind. Intelligence tests as they are designed, tend to measure particularly what an individual is on the intellectual

side by virtue of his heredity On the emotional side, except for temperament there is hardly anything that differentiates the natural endowments of one individual from another The innate tendencies are there in all, but they are modified to give a good or bad character, according to the influence of the environment. Intelligence is not in the hands of the teacher The level is fixed, which he cannot alter; but having known it, he can help the individual to utilize it as best as possible. Character is in his hands. Within certain limits a school must guarantee a certain type of character For this again, a knowledge of intelligence would help the teacher; as that is the intellectual instrument with which he attempts to influence the individual, and form the character in him.

Apart from knowing what an individual is intellectually, it is necessary to find out something about his will, temperament, and character as a whole Hence, psychologists, while devising intelligence tests and gauging the nature of intelligence, have tried to penetrate into the working of the affective-conative system of the human mind The reaction-time experiments with word-associations, etc, are employed, particularly by psycho-analysts, to diagnose the affective side of the mind Very recently, another device called 'psycho-galvanic response' has been employed This depends on the fact that the resistance of the human body is decreased if emotion is aroused within To determine this experimentally, the arm of the subject is placed in one arm of a Wheatstone's Bridge arrangement, balanced against a variable resist-

ance A mirror galvanometer is used If he is given stimulations as in the word-association experiments, then there is emotional disturbance, and the spot of light deflects. The deflection gives the extent of influence, and is measured on the scale.

The study of temperaments is an old one We have mentioned the various types of temperaments which have been distinguished, *e g*, sanguine, phlegmatic, bilious, etc ; but, as said before, in actual observation we get more or less the mixed types Jung in modern times has classified the mental types into the extrovert, and the introvert: while Trotter gives the classification into the stable-minded, and the unstable-minded. The extrovert mostly turns his attention to things outside himself, and his energy finds an outlet in dealing with them He is too fond of the expression of his views and translating those views into action Often, on account of this tendency, his actions are not well thought out The introvert has his world of thought and activity within himself. Just as the extrovert projects outwards, the introvert draws inwards He thinks and decides within, and tends to be a dreamer rather than a man of action The stable-minded has fixed views and opinions, and believes in sticking to them The unstable-minded is sensitive to stimuli, and every experience tends to change his views He is adaptable in the extreme· so often a mere opportunist An examination of individuals on the basis of this classification will again make it clear, that while one may be predominantly of one type he has a touch of the other as well.

An objective study of character has been attempted by Webb,[1] which throws some light on the constitution of the human mind He conducted his research on: (1) Training College students,—98 during the last six months of their second year of training, and 96 during the similar period of the following year,—whose average age was twenty-one years, and (2) four groups of school boys—total number 140,—whose average age was twelve years. He adopted forty-eight mental qualities and divided them under the broad headings. emotions, self-qualities, sociality, activity, and intellect. He used twenty-five qualities for boys, and thirty-eight plus five for the Training College students The college prefects were employed as judges, and an estimate of each individual was obtained. Webb desired to find out if the mental make-up of the subjects showed only the general factor 'g,' or something more as well, when besides intellectual activity emotion was also involved. In his tests he gave various types of exercises including problematic situations,[2] in response to which the subject showed not merely the operation of 'g' but some other factor as well Webb's conclusion through his long researches was, that there existed another factor independent of 'g' which was concerned with 'persistence of motives or will-power.' This he designated as 'w'.

[1] *Vide* his thesis for D Sc published in the *British Journal of Psychology* as monograph supplement, Volume I, No III

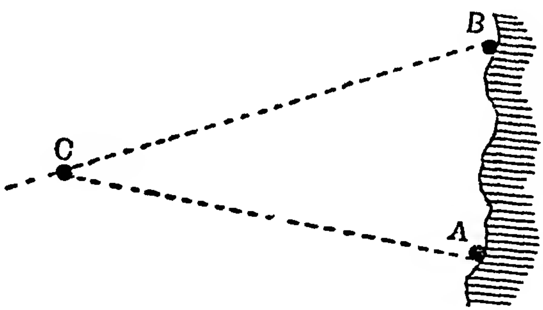
[2] For men students—age 21 years Time allowed 15 minutes

"Imagine the following situation·—

You and a young lady friend have taken a return day trip by steamer from a small coast town A to another small coast town B on a fine summer

Garnett by a further mathematical analysis of Webb's results elaborated the situation, and added another factor 'c'[1] which represents humour, cheerfulness, and originality. According to these researchers a man's mind, thus, may be made up of 'g,' 'w,' 'c' ('s' being present for each activity separately). Individuals differ so far as their quantitative possession of the factors 'w' and 'c' is concerned, and it is this which differentiates various temperamental and character types.

day. You spend the day pleasantly at B, but lose the only return boat which starts at 6-30 p.m. The only train connection from B to A is by a long route thus:



and if you took the train from B to C you would be too late to catch the last train from C to A. You are expected back at A by the young lady's mother, whom you are anxious to propitiate. She is nervous and has rather a strict sense of propriety. The distance by road is about 15 miles. You do not know anybody in B. You are not very well-to-do, but have about £2 in your pocket.

You are required to state concisely: (1) what are the alternative plans of procedure which you could adopt under these circumstances, (2) which of these plans you would actually choose, and (3) the reasons for your choice."

[1] GARNETT suggests that this factor might be describable as 'cleverness,' hence the notation, 'c.'

Raymond B Cattell[1] has conducted a research on temperamental tests The aim of this research was to determine the chief patterns of temperament and character as actually exist, specially with a view to draw out clearly, and comprehend the distinction between, the extrovert and the introvert types, etc. The method used was that of estimating personality traits Cattell's tests contained 46 pairs of traits, one opposite of the other. The pairs were of the following types:—

Sociable . ..	Unsociable
Gregarious .. .	Exclusive
Hasty . ..	Introspective
Orthodox . ..	Independent
Co-operative	Distrustful

Account was taken of Webb's qualities under 'w' and Garnett's qualities under 'c' The subjects of the experiment were, 62 Training College students ranging between eighteen and twentye-five years Four students of the same college were judges. Cattell's conclusions confirm the existence of 'c' and 'w' as independent factors, and establish the distinction between the two opposite types Cattell brings forward two further factors 'm' and 'a,' to which he gives the names 'maturity' and 'adjustment' respectively "The former is found in a group of qualities which tend to come with

[1] Vide *British Journal of Psychology*, January, 1933, pages 308 329
CATTELL has conducted further researches on temperament patterns, vide *British Journal of Psychology*, July, 1933, pages 20 49,

maturity, whilst the latter underlies a set of qualities which in clinical practice are commonly regarded as characterizing the well-adjusted rather than the maladjusted individual." So far as the factor 'a' is concerned its existence over and above 'w' and 'c' is substantiated, but same is not the case with 'm'. The factor 'a' "survives the elimination of 'c' and 'w' and possibly absorbs 'm' to itself."

Objective tests of character and temperament are few and also not yet generally accepted. The more usual procedure of investigating these qualities is with the help of personal interviews, family records and the opinions of teachers and ohers who have come in contact with the individual.

However a certain psychological technique is now being developed which promises to have a bright future. Some of these devices are to employ the Free Association methods of Freud and Jung and the Ink Blot methods due to Roerschach. The essential principle of both these methods is to let the mind of the subject be perfectly free so that his innermost feelings and emotions may come up and may express themselves in one form of association or another. These methods thus provide us with certain probes[1] of character.

The Perseveration Test[2] has also been, curiously enough, found to correlate highly with certain character qualities. Although the full implications of the Perseveration score in respect of the character qualities of

[1] R. B. CATTELL: A Guide to Mental Testing, P. 190.

[2] *Ibid*, P. 207.

an individual are not yet quite clear, it seems undoubtedly true that this is one of the very few reliable objective tests of character that we have at the present.

References for further reading

1 SPEARMAN. *Nature of Intelligence and the Principles of Cognition.*
2 SPEARMAN *The Abilities of Man.*
3 G H. THOMSON: *Instinct, Intelligence and Character.*
4 G. H THOMSON *The Factorial Analysis of Human Ability.*
5 BURT· *Mental and Scholastic Tests.*
6 BURT *The Factors of the Mind*
7 L L THURSTON: *Vectors of Mind*
8 L. L. THURSTON· *Primary Mental Abilities*
9 R B CATTELL *A Guide to Mental Testing.*
10 H R HAMLEY: *The Testing of Intelligence*
11 P. E VERNON *The Measurement of Abilities.*
12 BROWN & THOMSON *Essential of Mental Measurement.*
13 TERMAN & MERRILL *Measuring Intelligence*
14 KAMAT *Measuring Intelligence of Indian Children*

CHAPTER XIV

ADOLESCENCE

THE most critical period of an educand's development with which the teacher has to deal, is that of adolescence. In our Anglo-Vernacular schools a boy or girl generally enters at the age of eight or nine years and goes on for eight to ten years, according as he or she takes the High School or the Intermediate Examination The major portion of this span falls in the period of adolescence, and hence the teacher needs to know the psychology of adolescence adequately.

WHAT IS ADOLESCENCE?

It is not easy to define exactly the period of life which constitutes adolescence Speaking generally, it is that period of youth which is intermediate between the periods of childhood and adulthood It is markedly a period of growing up, during which the child develops into a man or woman It is difficult to fix sharp chronological boundaries to this period of life Its onset and termination are both gradual

Adolescence is best defined in relation to puberty. The endocrine glands, while they are active from birth, are not functionally active as reproductive organs till this period. Their primary function is to help the growth of the body and mind. Their secondary function, that of reproduction, appears at the onset of

puberty The dawn of the reproductive function, which ushers in adolescence, is quickened in some cases and delayed in others The difference is due to sex, race, climate, individual constitution, etc Leaving aside exceptional cases the onset of puberty occurs in boys between 13 and 17 years, and in girls between 12 and 16 years As regards the duration of adolescence the period ranges from five to eight years. Burt considers it to be six to seven years, Jones regards it as six years In India the onset is on an average a year earlier both for boys and girls than in the colder countries of the west. The earlier appearance often indicates shorter duration, and the individual settles down to adult life rather early. The onset of puberty is gradual According to some, the pubertal period takes two years to be set

Physical Characteristics

There are marked phases of physical growth both among boys and girls during this period of life This being a period of growing up, there is a noticeable growth both in size and in weight Growth in size and weight are not necessarily synchronous At certain times it may even be noticed that when growth is very rapidly proceeding in one direction, it goes on very slowly in the other In boys the growth in heights is said to take place up to the age of twenty-two but in girls it finishes at twenty Growth in height is more rapid in the earlier stage than in the later Amongst girls the growth in weight is more synchronous with

growth in height than in the case of boys, because of the roundness of form characteristic of the female sex.

As the height and weight grow, all the organs of the body share[1] the growth. But all parts do not grow in equal ratio, nor is the growth steady. The development cannot be represented by a straight line. The head and the brain have their maximum growth during childhood The weight of the brain at eight is almost the same as that of an adult. It ceases to grow in size after puberty But certain parts like the reproductive organs, hips, etc, grow particularly rapidly during adolescence

Bones and muscles increase to the greatest possible extent, since there is a great increase in the motor activity during the period of adolescence Since the large muscles grow rapidly, there should be as much opportunity for active outdoor life as possible to give the physical frame a good tone Not only does motor activity increase but there also is a great development in the motor power.[2]

The heart also grows in size, but it does not keep pace with bones and muscles As regards the lungs, the vital capacity shows special increase It shows a rapid growth from twelve years to sixteen years. The vital capacity is practically greatest at sixteen After

[1] There may be an exception, as in the case of the thymus gland which shrinks gradually as adulthood sets in

[2] See HALL *Adolescence*, Vol. I, page 141

"In general, the boys almost double their eleven-year-old strength of dynamometer grip by the time they are sixteen This is nearly the case with girls Neither will ever double again, but boys will more than treble their eleven-year-old strength and girls will not"

this the growth is very slow The growth, however, is considerably altered by the influence of physical exercises.

Apart from the differences in the rates and times of the growth of the body in boys and girls, there are also different types of developments in the organs, owing to sex differences The functional difference between the male and the female at the onset of puberty is responsible for this The muscular and the bodily developments have biological significance. Life begins to have a new orientation There is a tendency to abandon the old life of dependence and lead a new one. Old affection bonds tend to be weakened and new ones to be formed, owing to the primitive tendency of meeting a mate of the opposite sex and forming a new family Food seeking, pugnacity, courtship, all are to be brought into exercise by the boy. His muscular development is prominently suited to satisfy food seeking and pugnacity The female form gets fuller, there is much more increase of fat than in the case of the boy The rounding and fullness of certain parts help in attracting the members of the opposite sex, and the nourishment stored in the system is useful for the demands of maternity when the need arises

The shifting of interest in the life—both of the boy and the girl—with the onset of puberty owing to the biological needs, has a far-reaching social significance Certain instincts and tendencies become very vigorous in their action, and their play is to be controlled and regulated more carefully than at any other stage of life, so as to be operative only into the

channels permissible by civilized society. It is in this connection that the task of the educator of the adolescent is most responsible.

Mental and Emotional Characteristics

I. *Sex-Consciousness.*—The sex-instinct, both in the boy as well as in the girl, becomes very active,[1] and tends to exert enormous influence on the emotional as well as the intellectual activities of the individual. It is needless to emphasize that the maturing of the sex involves certain risks, and the growing child needs to be trained and supervized carefully. Sex education must be given judiciously by parents and teachers any time about 12+ to avoid damage being done. Boys and girls have mysterious ideas about sex, and these get distorted under misguided influence. Girls should be educated as regards menstruation, and boys as regards the involuntary changes brought about in the genital organs. It is the business of the educators to help the growing boy or girl in the struggle for self-control without effecting any repression. Abundance of interesting mental and manual work, plenty of outdoor exercises and games, regular sleep, and

[1] The Freudian view may also be considered. According to the psycho-analysts, the sexual development during adolescence is the recapitulation of the infantile sexual history. The sexual impulse is strong in earlier childhood. It becomes dormant in later childhood. In adolescence the repressed impulse is aroused again. But now it reawakens on a different plane. The child impulse is directed towards parents and self. The adolescent's is projected on members of the opposite sex, who are strangers. We see no difficulty in accepting that children are not sexless, but it must be emphasized that, in the strict sense, they are not sexually active till adolescence.

hygienic food arrangements, etc., all play their part in the sublimation of the tendency during this critical period of life

II. *Contrasting mental moods*—The emotional development during adolescence is so queer that in the reactions of the same individual a great contrast is noticeable The boy at one time is abnormally active, and at another tends to be unpardonably lazy. He feels so elated in a certain situation, and in a similar one, on a later occasion, he is so depressed. At one time he may be extremely selfish, while at another, under a wave of emotion, he may show himself entirely selfless and altruistic. There is some antithesis in the emotional moods of us all, but that during the period of adolescence is particularly marked.

This peculiar state of affairs is due to lack of adjustment in the emotional life of the adolescent Adolescence is regarded as the period of recapitulation of the earlier childhood on a higher level. According to Hall, quite a number of the features of infancy are repeated The individual finds himself, physically as well as mentally, not properly fitting in the environment in which he happens to be, just as he felt during early childhood He thinks he is like the odd person in the street on whom all attention is focussed. A peculiar shyness characterizes both boys and girls. Intellectually the adolescent is superior to, and more settled than, the young child, but emotionally he is unsettled and disturbed, and that is why he experiences opposite types of emotions

III. *Mental independence and revolt to authority.*—The passively receptive child gradually assumes an active role The instinct of curiosity is very marked in childhood During pre-adolescence it suffers a little diminution, but during adolescence it is re-activated. But while this curiosity is a reminiscence of earlier childhood, it now manifests itself in a higher form. It is not the 'what' that satisfies the adolescent, but the 'why' and 'how' must be fully scrutinized. Sexual curiosity is keen. Information about adult life is actively sought.

There is a strong tendency of self-assertion which is prominent owing to the new orientation which sets in life The adolescent wants to free himself from bondage. This independence exhibits itself both in the matter of intellectual as well as physical control. The revolt to authority is marked in disciplinary matters, but the not-taken-for-granted attitude strongly appears so far as intellectual activities also are concerned

According to the theory of recapitulation, during adolescence there is a constant tendency of regression to infantile mentality. And often, the parent or the educator is alarmed at the exhibition of disproportionate conduct on the part of the boy or the girl. The youth behaves like the child, but the methods of discipline adopted with children cannot be repeated in his case The adolescent has an unsettled emotional life, and sympathy works better than the chastisement methods.

IV. *Imaginative activity and hero-worship*—An important phase of the recapitulation theory can be seen in the imaginative activity of the adolescent There is an exuberance of imaginative activity of the phantastic type in childhood The adolescent also has a richness of phantastic imaginative activity The scope for the activity is considerably increased because of the greater field available to him Fairy tales get replaced by novels of adventure, travel, history, and similar types of literature The important characters of these grip the adolescent mind, and the boy or the girl makes ready choices for his or her ideals The idealism is often distorted A flash cinema star sometimes becomes the hero that the adolescent worship Regulation of suitable literature is as important at this stage as it can ever be

V *Intellectual activities and interests*—So far as the growth of intelligence is concerned, it reaches the maximum during the period of adolescence There is, however, no abrupt cessation So far as the expression of this intelligence is concerned, it assumes various directions characteristic of this stage There are certain types of intellectual pursuits which become the favourites during this period History, literature, and art unfold themselves in their true form to the adolescent mind

The taste is markedly materialistic in the beginning Men and their doings, objective world and its manifestations, are the matters round which the interest is centred The adolescent is extremely passionate

for expressing his own opinions and appreciation. If he does not find sufficient scope to extol his heroes, or his likes and dislikes, he actively creates opportunities to give expression to his views in a group of his companions and equals. Because of hasty idealism there is a rush on the part of the adolescent to seriously enter the field of philosophy. He regards himself as more suited than the adults and grown up to frame laws, rules, codes of morals, which will be just and true. So far as the study of sciences is concerned, their mechanical phase is most interesting at this stage A group of adolescents sets to practical work with great zeal, and works patiently. The full force of self is sometimes put by the boys in getting through an allotted piece of work.

The physical and mental changes which occur during the period of adolescence bear on the educational principles The characteristics have to be taken into account both in training the character and in methods of teaching There are certain things which concern the general organization of the educational system.

In view of the rapid physical growth the importance of suitable physical education and organized games has to be fully realized. Special attention to proper exercises is necessary in order to render the growing muscles sufficiently strong. If left unexercised at this stage a flabby constitution for the rest of the life is the result. An increase in the amount of organized games and outdoor activities is again essential in order to direct the force behind the sex tendency. Games facilitate sublimation.

The wander-lust being prominent, other outdoor activities besides the regular games should be introduced Boy scouting on a wide scale does much more good to the boy at this stage than anything else Again, whether one agrees with all the methods of the German youth movement or not, one cannot help advocating the necessity of educational excursions at this stage In Indian schools excursions to suitable places are very rarely organized There is considerable opportunity in every area for organizing short local excursions which may be of distinct educative value It is not necessary that an excursion should be one involving regular work There must be some hikes arranged in connection with scouting work

The adolescent is impelled by a spirit of independence from within. This independence can be trained by shifting some responsibility to boy and girls in certain matters concerning organization of games, routine of discipline, etc Various well-known measures can be adopted for training in responsibility

What holds for the training of character by handing over some responsibility to the adolescent, holds also so far as intellectual activities are concerned The principle of making the boy learn as much by himself as possible must be fully made use of. There is a strong tendency towards spoon feeding in our Secondary Schools, and in certain places the evil even spreads to the University stage. The effect of such procedure on one's mental training is far reaching, in so far as his achievements in life are concerned. The Project Method or the Dalton Plan, specifically

so called, may or may not be adopted, but it is easy for the teacher to realize their spirit in his day-to-day teaching of boys at this stage. The methods of teaching employed should increase the active share of the boy. Boys at this stage have a tendency to experiment for themselves, to think, to reason, and not to take things for granted. The teacher must take advantage of the bubbling enthusiasm, always ensuring that the flow of mental and physical energy takes place into the proper channels. The self-expressive tendency of the boy is not to be thwarted, not to be let loose either, but to be regulated and well directed.

One or two matters of general organization are important. Owing to the development of the sex instinct, the question is raised whether co-education, should be continued or not In western countries co-education is the practice in the primary schools In the secondary stage it is very much restricted, most of the systems having separate schools for boys and girls. In the University stage the two sexes come together again. In India there being little or no co-education in the primary stage the question of continuing it does not arise. If co-education existed boys and girls would later need to be segregated. Some advocate the necessity of this purely on grouneds of sex, believing that damage is done by keeping the two sexes together when the sex tendency is rising strongly. But the necessity for separation on this ground alone is not entirely justified. Some see no objection in keeping boys and girls together in the same institution. The necessity for separation arises really out of the fact

that the boys and girls need quite different types of curricula. The differentiation in the syllabuses arises out of sex differences, and in view of the fact that the two will have to play different roles in society later.

The other matter of organization is the remodelling of the courses of study. There is not much dispute as regards the general lines of study in the primary stage, but the conditions are entirely different when we come to deal with children at 12+. In India we have the peculiar division of the educational system into Vernacular and Anglo-Vernacular education In the former, the two stages, primary and secondary, are recognized In the latter, the Anglo-Vernacular High School or the Intermediate College is primarily a secondary school, having more or less a similar system of work and teaching from the lowest to the highest classes A child really begins half way up in the primary stage and finds himself in an unbroken system through which he has to go. It is definitely a course of liberal education that the boy or girl has to get through Every child, irrespective of what his I. Q., social standing, future possibilities are, goes through the same grind mill. The only things that hamper his onward march are continued failure in some examination, and financial difficulties Controlled merely by these factors not only does he go through the secondary stage but also as far up the University as he can, just to find himself another addition to the already crowded ranks of the unemployed

After the child has passed his pre-adolescent period and entered adolescence, he must be provided with

facilities for spending his energies in acquiring knowledge and training suited to his needs. The question of giving definite pre-vocational training on a wide scale is extremely pressing in this country. The problem is acute in the Anglo-Vernacular system. It is not absent from Vernacular education either. There is room for experimental schools specially in the upper stages of the Vernacular School where a syllabus not merely having a liberal basis but having also a distinctly vocational bias is followed. The details of the vocational basis can easily be obtained through a study of the local professions and industries.

In advocating separate types of syllabuses, varied types of schools, we do not want to carry forward the argument for the abolition of the liberal system ot education. There is a place even for the typical literary course for some, and by all means they should have it. But all minds do not need the same dose of the same nutriment. What is easy digestion for one is a useless grind for another. Again, while specialization and pre-vocational training of different types are to be introduced, all attempts must be made to ensure cultural unity in the peoples of a country—ambitiously speaking, amongst humanity as a whole. 'While the duty of schools for adolescents may be in large part to train for special work in the world, either because of the need of the world or because of the interests of the young, it is also their duty to see that the occupational mannerisms, outlook, and prejudices do not obscure the common humanity of all. The school of the adolescent must provide all its pupils with a common

background of some sort which will be a link between the plumber and the solicitor, the farmer and tthe factory mechanic ..... Part of the duty of the adolescent school is to keep the wider outlook, to see the whole as well as the parts, and while making good thinkers, good workmen, and good tradesmen, to make them all equally men and women"[1] In this sense, what is true of education during the period of adolescence is true of education in general While diversity in expression becomes essential, the unity in diversity must equally be maintained.

References for further reading

1 STANLEY HALL: *Adolescence*, Vols. I and II.

2 NUNN: *Education· Its Data and First Principles*, Chapter XII.

3 G. H. THOMSON *A Modern Philosophy of Education*, Chapters XI and XII.

4 *The Education of the Adolescent*, issued by the Board of Education (England).

5 GRUENBERG *Guidance of Childhood and Youth*, Chapters XXII and XXIII.

[1] GODFREY H THOMSON *A Modern Philosophy of Education*, pages 238-39.

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